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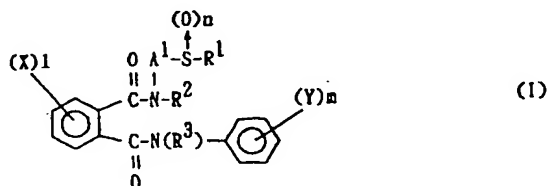
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(54) **Phthalamide derivatives, or salt thereof agrohorticultural insecticide, and method for using the same**

(57) The present invention provides a phthalamide derivative of the formula (I):



[wherein A¹ is (substituted) C₁-C₈ alkenylene,

(substituted) C₃-C₈ alkenylene, (substituted) C₃-C₈ alkynylene, etc., R¹ is H, (halo) C₃-C₆ cycloalkyl, (substituted) phenyl, (substituted) heterocycle, -A²-R⁴, etc., R² and R³ are H, C₃-C₆ cycloalkyl, -A²-R⁴, etc., A² is -C(=O)-, -C(=S)- or -C(=NR⁵)-, R⁴ is H, alkyl, (substituted) phenyl, (substituted) heterocycle, etc., X and Y are hydrogen, cyano, nitro, (halo) C₁-C₆ alkyl, (halo) C₁-C₆ alkoxy, etc., 1 is 0-4, m is 0-5, n is 0-2]; and an agrohorticultural insecticide containing said compound as active ingredient and exhibiting an excellent insecticidal effect.

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Description

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

[0001] The present invention relates to a phthalamide derivative or salt thereof, an agrohorticultural insecticide containing said compound as an active ingredient thereof, and a method for using the agrohorticultural agent.

RELATED ART

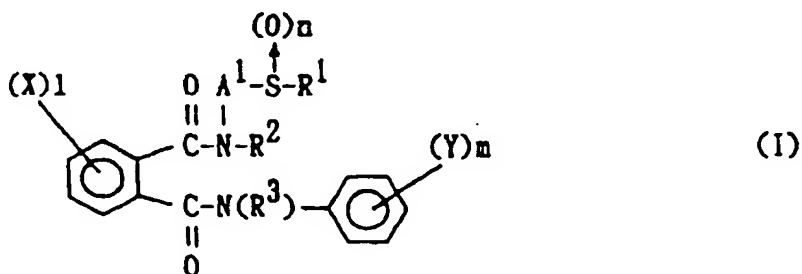
[0002] JP-A-61-180753 discloses some of the phthalamide derivatives of the present invention. However, in that patent application specification, there is neither disclosed nor suggested about usefulness of said derivatives as an agrohorticultural insecticide. Further, although similar compounds are disclosed in JP-A-59-163353 and J. C. S. Perkin I, 1338-1350 (1978), etc., there is made no mention nor suggestion in these publications about usefulness of those compounds as an agrohorticultural insecticide.

SUMMARY OF THE INVENTION

[0003] The present inventors have conducted extensive studies with the aim of developing a novel agrohorticultural agent. As a result, it has been found that the phthalamide derivatives of the present invention represented by general formula (I), which are novel compounds not found in literature, can be put to a novel use as an agrohorticultural insecticide comprising not only these novel compounds but also some known compounds disclosed in prior art. Based on this finding, the present invention has been accomplished.

DETAILED DESCRIPTION OF THE INVENTION

[0004] The present invention relates to phthalamide derivatives represented by the following general formula (I) or salt thereof, an agrohorticultural insecticide containing, as active ingredients thereof, the phthalamide derivative represented by the general formula (I) or salt thereof and some known compounds, and a method for using the same:



wherein A¹ represents C₁-C₈ alkylene group, substituted C₁-C₈ alkylene group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, hydroxy C₁-C₆ alkyl group, C₁-C₆ alkoxy C₁-C₆ alkyl group, C₁-C₆ alkylthio C₁-C₆ alkyl group, C₁-C₆ alkoxycarbonyl group, phenyl group and substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, C₃-C₈ alkenylene group, substituted C₃-C₈ alkenylene group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, C₁-C₆ alkylthio C₁-C₆ alkyl group, C₁-C₆ alkoxycarbonyl group, phenyl group and substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfonyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and

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C₁-C₆ alkoxycarbonyl group, C₃-C₈ alkynylene group, or substituted C₃-C₈ alkynylene group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, C₁-C₆ alkylthio C₁-C₆ alkyl group, C₁-C₆ alkoxycarbonyl group, phenyl group and substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group,

further, an arbitrary saturated carbon atom in said C₁-C₈ alkylene group, substituted C₁-C₈ alkylene group, C₃-C₈ alkenylene group, substituted C₃-C₈ alkenylene group, C₃-C₈ alkynylene group and substituted C₃-C₈ alkynylene group may be substituted with a C₂-C₅ alkylene group to form a C₃-C₆ cycloalkane ring, and arbitrary two carbon atoms in said C₁-C₈ alkylene group, substituted C₁-C₈ alkylene group, C₃-C₈ alkenylene group and substituted C₃-C₈ alkenylene group may be taken conjointly with an alkylene group or an alkenylene group to form a C₃-C₆ cycloalkane ring or C₃-C₆ cycloalkene ring;

R¹ represents hydrogen atom, mercapto group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, phenylthio group, substituted phenylthio group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, heterocyclic group, substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, or -A²-R⁴ [wherein A² represents -C(=O)-, -C(=S)-, -C(=NR⁵)- (in which R⁵ represents hydrogen atom, C₁-C₆ alkyl group, C₁-C₆ alkoxy group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, C₁-C₆ alkoxycarbonyl group, phenyl group or substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group),

C₁-C₈ alkylene group, halo C₁-C₈ alkylene group, C₃-C₆ alkenylene group, halo C₃-C₆ alkenylene group, C₃-C₆ alkynylene group or halo C₃-C₆ alkynylene group; and

(1) in cases where A² represents -C(=O)-, -C(=S)- or -C(=NR⁵)- wherein R⁵ is as defined above, R⁴ represents hydrogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, heterocyclic group, substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group,

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C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, phenyl C₁-C₄ alkyl group, substituted phenyl C₁-C₄ alkyl group having, on the ring thereof, at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, heterocyclic group, or substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group], or

alternatively, R¹ may be combined with A¹ to form a 5- to 8-membered ring which may be intercepted by 1 or 2, same or different oxygen atoms, sulfur atoms or nitrogen atoms;

R² and R³ which may be same or different, represent hydrogen atom, C₃-C₆ cycloalkyl group or -A²-R⁴ wherein A² and R⁴ are as defined above; or

alternatively, R² may be combined with A¹ or R¹ to form a 5- to 7-membered ring which may be intercepted by 1 or 2, same or different oxygen atoms, sulfur atoms or nitrogen atoms;

X which may be same or different, represents halogen atom, cyano group, nitro group, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, C₁-C₆ alkoxycarbonyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, heterocyclic group, substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, or -A³-R¹¹ [wherein A³ represents -O-, -S-, -SO-, -SO₂-, -C(=O)-, -C(=NOR¹²)- (in which R¹² represents hydrogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₃-C₆ alkenyl group, halo C₃-C₆ alkenyl group, C₃-C₆ alkynyl group, C₃-C₆ cycloalkyl group, phenyl C₁-C₄ alkyl group or substituted phenyl C₁-C₄ alkyl group having, on the ring thereof, at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group), C₁-C₆ alkylene group, halo C₁-C₆ alkylene group, C₂-C₆ alkenylene group, halo C₂-C₆ alkenylene group, C₂-C₆ alkynylene group or halo C₃-C₆ alkynylene group; and

(1) in cases where A³ represents -O-, -S-, -SO- or -SO₂-, R¹¹ represents halo C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkenyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, heterocyclic group, substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group,

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or -A⁶-R¹⁵ (wherein A⁶ represents -O-, -S-, -SO-, -SO₂-, and R¹⁵ represents C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, heterocyclic group, substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, or -A⁷-R¹⁶ (wherein A⁷ represents C₁-C₆ alkylene group, halo C₁-C₆ alkylene group, C₂-C₆ alkenylene group, halo C₂-C₆ alkenylene group, C₂-C₆ alkenylene group or halo C₃-C₆ alkenylene group, and R¹⁶ represents hydrogen atom, halogen atom, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, phenoxy group, substituted phenoxy group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, heterocyclic group, substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group)); and I represents an integer of 0 to 4; and

alternatively, X may be taken conjointly with the adjacent carbon atom on the phenyl ring to form a fused ring, and said fused ring may have at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group; and

Y may be same or different and represents halogen atom, cyano group, nitro group, halo C₃-C₆ cycloalkyl group, tri C₁-C₆ alkylsilyl group in which C₁-C₆ alkyl groups may be same or different, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, heterocyclic group, substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group.

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or -A³-R¹¹ wherein A³ and R¹¹ are as defined above; and m represents an integer of 0 to 5; and

Y may be taken conjointly with an adjacent carbon atom on the phenyl ring to form a fused ring, and said fused ring may have at least one, same or different substituents selected from the group consisting of halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, heterocyclic group, and substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group; and

n represents an integer of 0 to 2;

provided that when X, R² and R³ simultaneously represent hydrogen atom, m represents an integer of 2, Y of the 2-position represents fluorine atom and Y of the 3-position represents chlorine atom, then A¹ is not propylene group, R¹ is not methyl group and n is not an integer of 0.

[0005] In the definition of the general formula (I) representing the phthalamide derivative of the present invention, the term "halogen atom" means chlorine atom, bromine atom, iodine atom or fluorine atom; the term "C₁-C₆ alkyl" means a straight or branched chain alkyl group having 1 to 6 carbon atoms such as methyl, ethyl, n-propyl, i-propyl, n-butyl, i-butyl, s-butyl, t-butyl, n-pentyl, n-hexyl and the like; the term "halo C₁-C₆ alkyl" means a straight or branched chain alkyl group having 1 to 6 carbon atoms which may be substituted with at least one, same or different halogen atoms; the term "C₁-C₈ alkylene" means a straight or branched chain alkylene group having 1 to 8 carbon atoms such as methylene, ethylene, propylene, trimethylene, dimethylmethylene, tetramethylene, isobutylene, dimethylethylene, octamethylene and the like; the term "a 5- to 8- or 5- to 7-membered ring which may be intercepted by 1 to 2, same or different oxygen atoms, sulfur atoms or nitrogen atoms formed by R¹ with A¹, or R² with A¹ or R¹¹" means, for example, perhydrothiazine ring, thiazolidine ring, thiazetidine ring, dihydrothiazine ring, thiazoline ring, perhydroxathiazine ring, dihydroxathiazine ring, dithiazine ring, perhydrodithiazine ring, and the like.

[0006] The term "heterocyclic group" means 5- to 6-membered heterocyclic group having one or more same or different hetero atoms selected from oxygen atoms, sulfur atoms or nitrogen atoms such as pyridyl group, pyridine-N-oxide group, pyrimidinyl group, furyl group, tetrahydrofuryl group, thienyl group, tetrahydrothienyl group, tetrahydropyranyl group, tetrahydrothiopyranyl group, oxazolyl group, isoxazolyl group, oxadiazolyl group, thiazolyl group, isothiazolyl group, thiadiazolyl group, imidazolyl group, trithiazolyl group, pyrazolyl group, and the like. As the "fused ring", there can be exemplified naphthalene, tetrahydronaphthalene, indene, indane, quinoline, quinazoline, indole, indoline, coumarone, isocoumarone, benzodioxane, benzodioxole, benzofuran, dihydrobenzofuran, benzothiophene, dihydrobenzothiophene, benzoxazole, benzothiazole, benzimidazole, indazole, and the like.

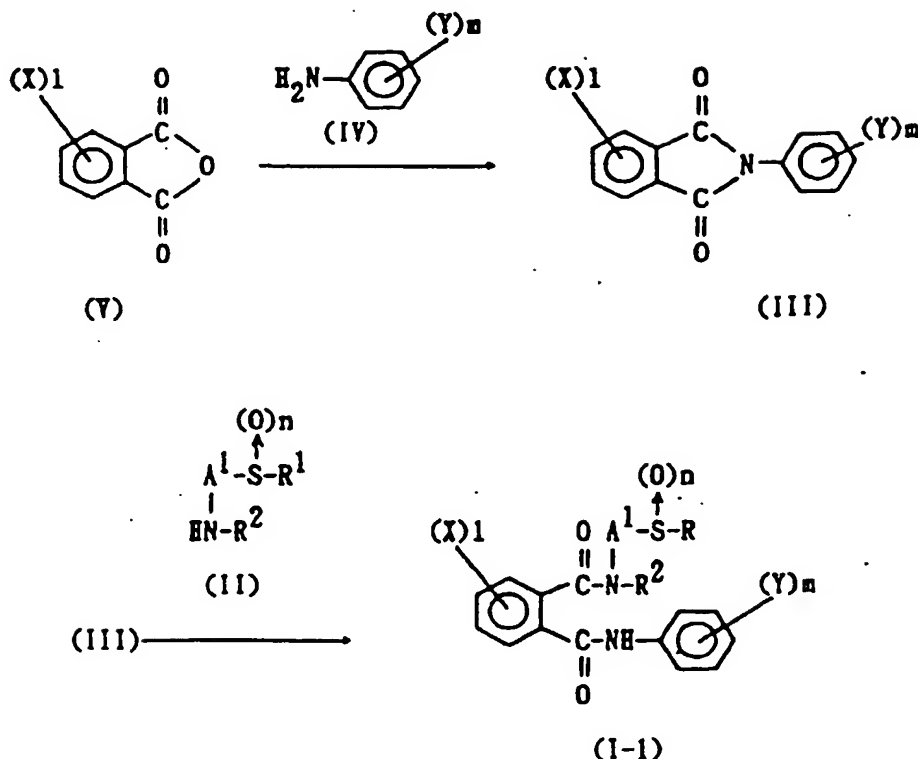
[0007] As a salt of a phthalamide derivative represented by the general formula (I) of the present invention, there can be exemplified inorganic acid salt such as hydrochlorate, sulfate, nitrate, phosphate and the like; organic acid salt such as acetate, fumarate, maleate, oxalate, methanesulfonate, benzenesulfonate, p-toluenesulfonate and the like; and salt of metallic ion such as sodium ion, potassium ion, calcium ion and the like.

[0008] Some of the phthalamide derivatives represented by the general formula (I) of the present invention contain an asymmetric carbon atom or an asymmetric center in the structural formula thereof, and in some cases there can exist two optical isomers. The present invention includes all these optical isomers and all the mixtures consisting of arbitrary proportions of these optical isomers.

[0009] Preferable examples of each substituent of the phthalamide derivative of general formula (I) or salt thereof of the present invention are A¹ is a straight or branched C₁-C₈ alkylene group; R¹ is C₁-C₆ alkyl group or halo C₁-C₆ alkyl group; each of R² and R³ is hydrogen atom or C₁-C₆ alkyl group; X is halogen atom, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group or halo C₁-C₆ alkoxy group; and Y is halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group or halo C₁-C₆ alkoxy group.

[0010] The phthalamide derivatives of the present invention represented by the general formula (I) can be produced, for example, by the production processes mentioned below.

Production process 1



wherein R^1 , R^2 , A^1 , X , Y , l , m and n are as defined above.

[0011] A phthalic anhydride derivative of the general formula (V) is reacted with an aniline of the general formula (IV) in the presence of an inert solvent to obtain a phthalimide derivative of the general formula (III). The phthalimide derivative (III) is reacted with an amine of the general formula (II) after or without being isolated, whereby a phthalamide derivative of the general formula (I-1) can be produced.

(1) General formula (V) \rightarrow general formula (III)

[0012] As the inert solvent used in this reaction, any solvent may be used so long as it does not markedly inhibit the progress of the reaction. There can be exemplified aromatic hydrocarbons such as benzene, toluene, xylene, etc.; halogenated hydrocarbons such as dichloromethane, chloroform, carbon tetrachloride, etc.; chlorinated aromatic hydrocarbons such as chlorobenzene, dichlorobenzene, etc.; acyclic or cyclic ethers such as diethyl ether, dioxane, tetrahydrofuran, etc.; esters such as ethyl acetate, etc.; amides such as dimethylformamide, dimethylacetamide, etc.; acids such as acetic acid, etc.; dimethyl sulfoxide; and 1,3-dimethyl-2-imidazolidinone. These inert solvents may be used alone or as a mixture thereof.

[0013] Since the reaction is an equimolar reaction, it is sufficient that the reactants are used in equimolar amounts, though either of them may be used in excess. If necessary, the reaction may be carried out under dehydrating conditions.

[0014] As to the reaction temperature, the reaction can be carried out in a temperature range of room temperature to the reflux temperature of the inert solvent used. Although the reaction time is varied depending on the scale of reaction, the reaction temperature, etc., it may be properly chosen in a range of several minutes to 48 hours.

[0015] After completion of the reaction, the desired compound is isolated from the reaction solution containing the desired compound by a conventional method, and if necessary, purified by recrystallization, column chromatography, etc., whereby the desired compound can be produced. The desired compound can be subjected to the subsequent reaction without isolation from the reaction solution.

[0016] The phthalic anhydride derivative of the general formula (V) can be produced by the process described in J. Org. Chem., 52, 129 (1987), J. Am. Chem. Soc., 51, 1865 (1929), J. Am. Chem. Soc., 63, 1542 (1941), etc. The aniline of the general formula (IV) can be produced by the process described in J. Org. Chem., 29, 1 (1964), Angew. Chem. Int. Ed. Engl., 24, 871 (1985), Synthesis, 1984, 667, Bulletin of the Chemical Society of Japan, 1973, 2351, DE-

2606982, JP-A-1-90163, etc.

(2) General formula (III) → general formula (I-1)

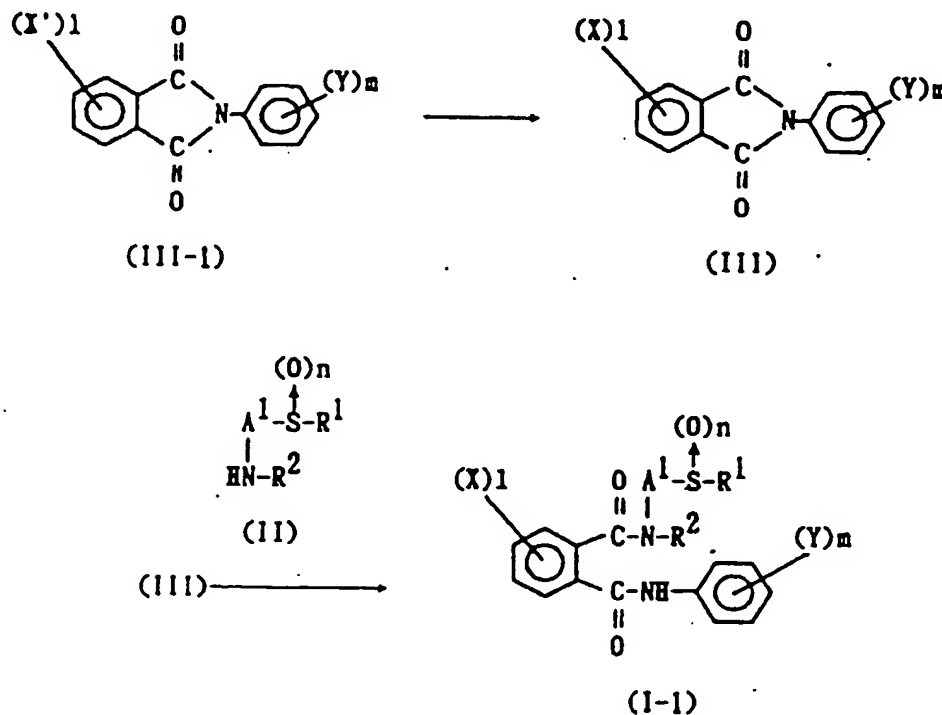
[0017] In this reaction, there can be used the inert solvents exemplified above as the inert solvent used in the reaction (1).

[0018] Since the reaction is an equimolar reaction, it is sufficient that the reactants are used in equimolar amounts, though the amine of the general formula (II) may be used in excess.

[0019] As to the reaction temperature, the reaction can be carried out in a temperature range of room temperature to the reflux temperature of the inert solvent used. Although the reaction time is varied depending on the scale of reaction, the reaction temperature, etc., it may be properly chosen in a range of several minutes to 48 hours.

[0020] After completion of the reaction, the desired compound is isolated from the reaction solution containing the desired compound by a conventional method, and if necessary, purified by recrystallization, column chromatography, etc., whereby the desired compound can be produced.

Production process 2



wherein R¹, R², A¹, X, Y, I, m and n are as defined above, X' is a halogen atom or a nitro group, provided that X is other than a hydrogen atom or a nitro group.

[0021] A phthalimide derivative of the general formula (III-1) is reacted with a reactant corresponding to X in the presence of an inert solvent to obtain a phthalimide derivative of the general formula (III). The phthalimide derivative (III) is reacted with an amine of the general formula (II) after or without being isolated, whereby a phthalimide derivative of the general formula (I-1) can be produced.

(1) General formula (III-1) → general formula (III)

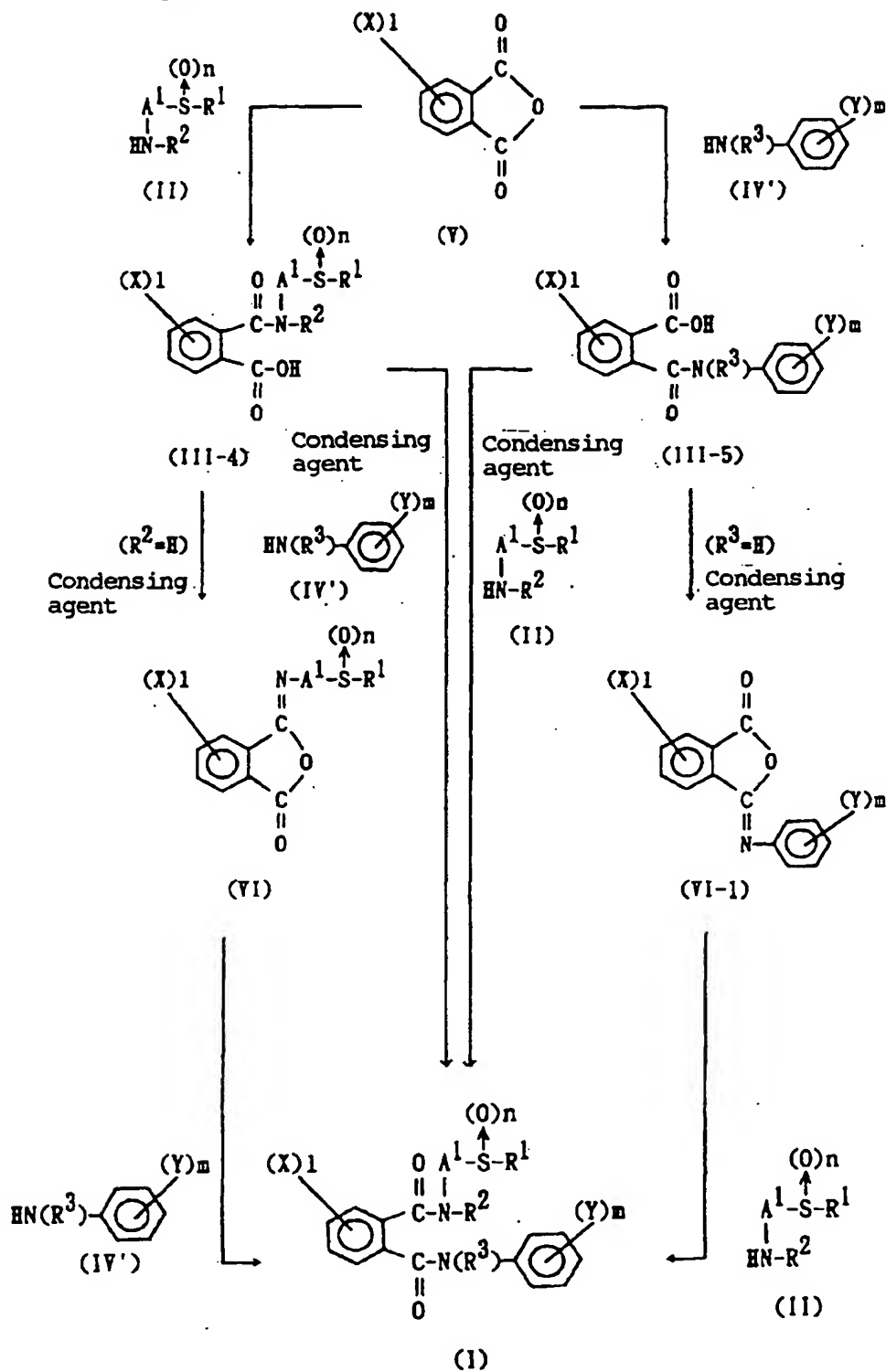
[0022] This reaction can be carried out according to the methods described in J. Org. Chem., 42, 3415 (1977), Tetrahedron, 25, 5921 (1969), Synthesis, 1984, 667, Chem. Lett., 1973, 471, J. Org. Chem., 39, 3318 (1974), J. Org. Chem., 39, 3327 (1974), etc.

(2) General formula (III) → general formula (I-1)

[0023]

This reaction can be carried out according to production process 1-(2).

Production process 3

wherein R^1 , R^2 , R^3 , A^1 , X , Y , l , m and n are as defined above.

[0024]

A phthalic anhydride derivative of the general formula (V) is reacted with an amine of the general

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formula (II) in the presence of an inert solvent to obtain a phthalamic acid of the general formula (III-4). The phthalamic acid (III-4) is treated as follows after or without isolation. When R^2 of the phthalamic acid (III-4) is a hydrogen atom, the phthalamic acid (III-4) is condensed into a compound of the general formula (VI) in the presence of a condensing agent, and the compound (VI) is reacted with an aniline of the general formula (IV) in the presence of an inert solvent after or without being isolated. When R^2 of the phthalamic acid (III-4) is other than a hydrogen atom, the phthalamic acid (III-4) is condensed with an aniline of the general formula (IV) in the presence of a condensing agent. Thus, a phthalamide derivative of the general formula (I) can be produced.

[0025] Alternatively, a phthalic anhydride derivative of the general formula (V) is reacted with an aniline of the general formula (IV) in the presence of an inert solvent to obtain a phthalamic acid of the general formula (III-5). The phthalamic acid (III-5) is treated as follows after or without isolation. When R^3 of the phthalamic acid (III-5) is a hydrogen atom, the phthalamic acid (III-5) is condensed into a compound of the general formula (VI-1) in the presence of a condensing agent, and the compound (VI-1) is reacted with an amine of the general formula (II) in the presence of an inert solvent after or without being isolated. When R^3 of the phthalamic acid (III-5) is other than a hydrogen atom, the phthalamic acid (III-5) is condensed with an amine of the general formula (II) in the presence of a condensing agent. Thus, a phthalamide derivative of the general formula (I) can be produced.

(1) General formula (V) or general formula (VI-1) \rightarrow general formula (III-4) or general formula (I), respectively

[0026] The desired compound can be produced by this reaction in the same manner as in production process 1-(2).

(2) General formula (III-4) or general formula (III-5) \rightarrow general formula (VI) or general formula (VI-1), respectively

[0027] The desired compound can be produced by this reaction according to the method described in J. Med. Chem., 10, 982 (1967).

(3) General formula (VI) or general formula (V) \rightarrow general formula (I) or general formula (III-5), respectively

[0028] The desired compound can be produced by this reaction in the same manner as in production process 1-(2).

(4) General formula (III-4) or general formula (III-5) \rightarrow general formula (I)

[0029] The desired compound can be produced by reacting the phthalamic acid derivative of the general formula (III-4) or the general formula (III-5) with the aniline of the general formula (IV) or the amine of the general formula (II), respectively, in the presence of a condensing agent and an inert solvent. If necessary, the reaction can be carried out in the presence of a base.

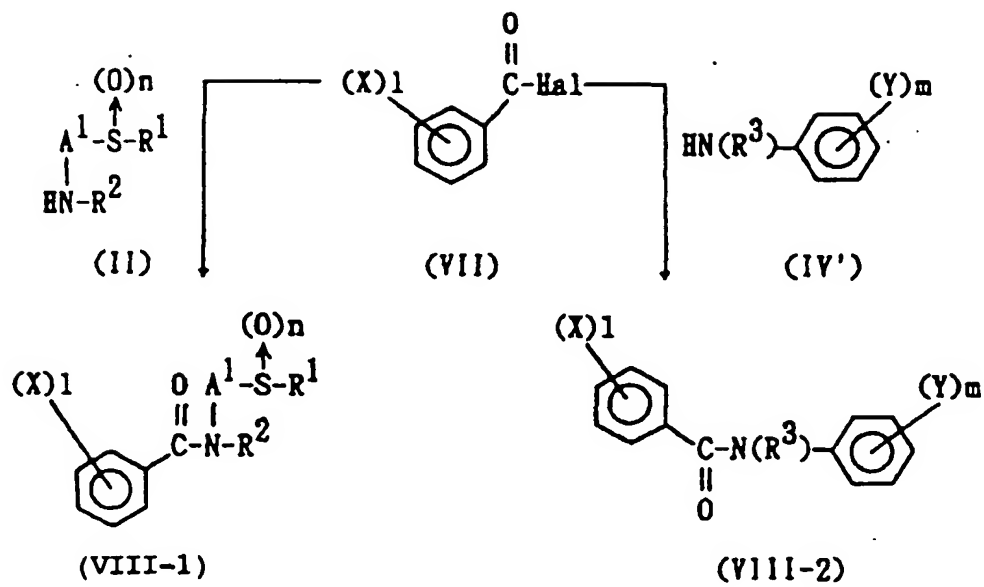
[0030] The inert solvent used in the reaction includes, for example, tetrahydrofuran, diethyl ether, dioxane, chloroform and dichloromethane. As the condensing agent used in the reaction, any condensing agent may be used so long as it is used in usual amide synthesis. The condensing agent includes, for example, Mukaiyama reagent (e.g. 2-chloro-N-methylpyridinium iodide), 1,3-dicyclohexylcarbodiimide (DCC), carbonyldiimidazole (CDI) and diethyl phosphorocyanidate (DEPC). The amount of the condensing agent used may be properly chosen in a range of 1 mole to excess moles per mole of the phthalamic acid derivative of the general formula (III-4) or the general formula (III-5).

[0031] As the base usable in the reaction, there can be exemplified organic bases such as triethylamine, pyridine, etc. and inorganic bases such as potassium carbonate, etc. The amount of the base used may be properly chosen in a range of 1 mole to excess moles per mole of the phthalamic acid derivative of the general formula (III-4) or the general formula (III-5).

[0032] As to the reaction temperature, the reaction can be carried out in a temperature range of 0°C to the boiling point of the inert solvent used. Although the reaction time is varied depending on the scale of reaction, the reaction temperature, etc., it ranges from several minutes to 48 hours.

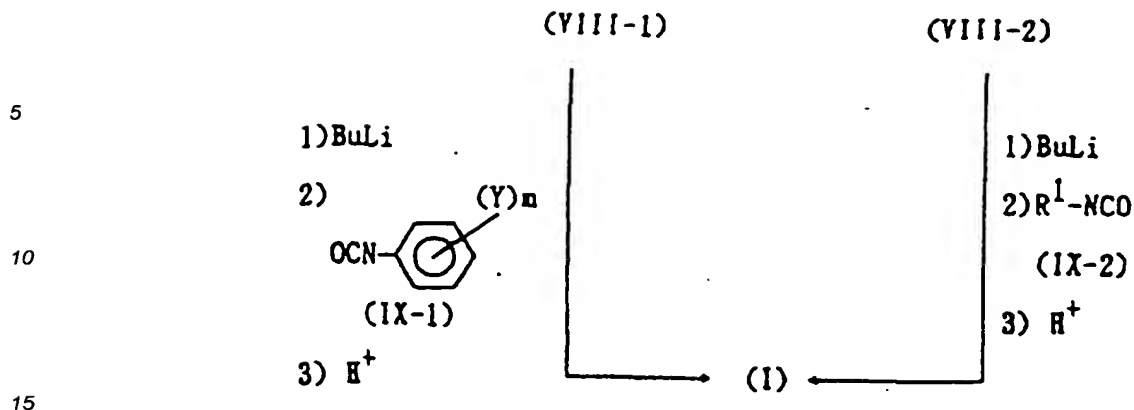
[0033] After completion of the reaction, the desired compound is isolated from the reaction solution containing the desired compound by a conventional method, and if necessary, purified by recrystallization, column chromatography, etc., whereby the desired compound can be produced.

Production Process 4





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wherein R¹, Y and m are as defined above.

[0034] A benzoyl halide of the general formula (VII) is reacted with an amine derivative of the general formula (II) or (IV) in the presence of an inert solvent to obtain a benzamide of the general formula (VIII-1) or (VIII-2). The benzamide (VIII-1) or (VIII-2) is ortho-metallized with a metallic reagent such as butyllithium or the like and then directly reacted with an isocyanate of the general formula (IX-1) or (IX-2). Alternatively, the benzamide (VIII-1) or (VIII-2) is reacted with carbon dioxide to obtain a phthalamic acid of the general formula (III-4') or (III-5') and then treated in the same manner as in Production process 3-(1) to (4). Thus, a phthalamide derivative of the general formula (I) can be produced.

(1) General formula (VII) → general formula (VIII-1) or general formula (VIII-2)

[0035] The desired compound can be produced according to the description of J. Org. Chem. 32, 3069 (1967), etc.

(2) General formula (VIII-1) or general formula (VIII-2) → general formula (I)

[0036] The desired compound can be produced by converting a benzamide of the general formula (VIII-1) or (VIII-2) into an ortho-lithio compound according to the description of J. Org. Chem. 29, 853 (1964) and then reacted with an isocyanate of the general formula (IX-1) or (IX-2) at a temperature of -80°C to room temperature, whereby the desired compound can be produced.

(3) General formula (VIII-1) or general formula (VIII-2) → general formula (III-4') or general formula (III-5'), respectively

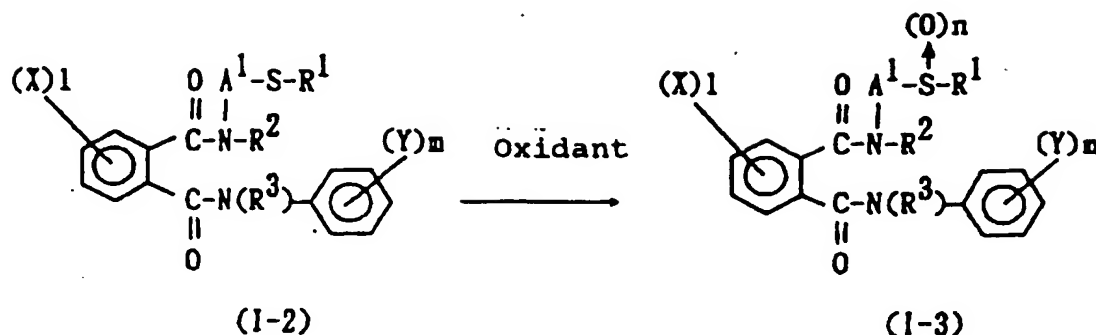
[0037] The desired compound can be produced by the same conversion into an ortho-lithio compound as in (2), followed by introduction of carbon dioxide at a temperature of -80°C to room temperature.

[0038] After completion of the reaction, the desired compound is isolated from the reaction solution by the conventional method and, if necessary, purified by recrystallization, column chromatography, etc., whereby the desired compound can be produced.

(4) General formula (III-4') or general formula (III-5') → general formula (I)

[0039] The desired compound can be produced by the same procedure as in production process 3-(1) to (4).

Production process 5



wherein R^1 , R^2 , R^3 , A^1 , X , Y , l , m and n are as defined above, provided that n cannot be an integer of 0.

[0040] A phthalamide derivative of the general formula (I-2) is reacted with an oxidant in the presence of an inert solvent, whereby a phthalimide derivative of the general formula (I-3) can be produced.

[0041] As the inert solvent used in this reaction, there can be exemplified halogenated hydrocarbons such as dichloromethane, chloroform, etc., aromatic hydrocarbon such as toluene, xylene, etc., acids such as acetic acid, etc., and alcohols such as methanol, ethanol, propanol, etc.

[0042] As the oxidant, there can be exemplified *m*-chloroperbenzoic acid, peracetic acid, potassium metaperiodate, potassium hydrogen persulfate (Oxon), hydrogen peroxide, etc. The amount of the oxidant may be properly selected in the range of 0.5 to 3 equivalents per equivalent of the phthalic acid diamide derivative of the general formula (I-2).

[0043] As to the reaction temperature, the reaction can be carried out in a temperature range of -50°C to the boiling temperature zone of the inert solvent used. Though the reaction time is varied depending on the reaction temperature and scale of the reaction, it is in the range of several minutes to 24 hours.

[0044] After completion of the reaction, the desired compound is isolated from the reaction solution containing the desired compound by a conventional method and, if necessary, purified by recrystallization, column chromatography, etc., whereby the desired compound can be produced.

[0045] Next, typical phthalamide derivatives of the general formula (I) are exemplified in Tables 1, 2 and 3. The present invention is by no means limited by these examples.

General formula (I)

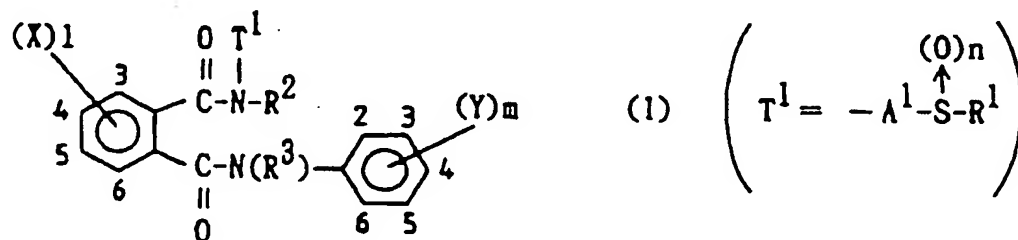


Table 1 ($R^2=R^3=H$)

No	T'	(X) l	(Y) m	Property mp (°C)
1	CH(CH ₃)CH ₂ SCH ₃	3-I	2-CH ₃ -4-C ₂ F ₅	179-180
2	CH(CH ₃)CH ₂ S-i-C ₃ H ₇	3-I	2-CH ₃ -4-C ₂ F ₅	Paste
3	CH(CH ₃)CH ₂ SCH ₃	3-I	2-CH ₃ -4-OCF ₃	147
4	CH(CH ₃)CH ₂ SCH ₃	3-I	2-CH ₃ -4-OCHF ₂	107
5	CH(CH ₃)CH ₂ S-i-C ₃ H ₇	3-I	2-CH ₃ -4-OCF ₃	126
6	CH(CH ₃)CH ₂ SCH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	197-199
7	CH(CH ₃)CH ₂ SCH ₃	3-I	2-Cl-4-C ₂ F ₅	143
8	CH(CH ₃)CH ₂ SCH ₃	3-I	4-OCF ₃	171-178
9	CH(CH ₃)CH ₂ SCH ₃	3-I	2-CH ₃ -4-Cl	179
10	CH(CH ₃)CH ₂ SCH ₃	3-F	2-CH ₃ -4-i-C ₃ F ₇	146-154
11	CH(CH ₃)CH ₂ SCH ₃	3-F	2-CH ₃ -4-C ₂ F ₅	140
12	CH(CH ₃)CH ₂ SCH ₃	3-F	2-CH ₃ -4-OCF ₃	122-130
13	CH(CH ₃)CH ₂ SCH ₃	3-F	2-CH ₃ -4-OCHF ₂	149-154
14	CH(CH ₃)CH ₂ SCH ₃	H	2-CH ₃ -4-C ₂ F ₅	139-146
15	CH(CH ₃)CH ₂ SCH ₃	H	2-CH ₃ -4-OCF ₃	140-144
16	CH(CH ₃)CH ₂ SCH ₃	H	2-CH ₃ -4-i-C ₃ F ₇	139-145
17	CH(CH ₃)CH ₂ SPh	3-I	2-CH ₃ -4-C ₂ F ₅	Paste
18	CH(CH ₃)CH ₂ SPh	3-I	2-CH ₃ -4-OCF ₃	Paste
19	CH(CH ₃)CH ₂ SPh	3-I	2-CH ₃ -4-i-C ₃ F ₇	Paste
20	CH(CH ₃)CH ₂ SPh	3-I	2-C ₂ H ₅ -4-C ₂ F ₅	Paste
21	CH(CH ₃)CH ₂ SC ₂ H ₅	3-I	2-CH ₃ -4-C ₂ F ₅	Paste
22	CH(CH ₃)CH ₂ SC ₂ H ₅	3-I	2-CH ₃ -4-i-C ₃ F ₇	107

Table 1 (Continued)

No	T'	(X) l	(Y) m	Property mp (°C)
23	CH(CH ₃)CH ₂ SC ₂ H ₅	3-I	2-CH ₃ -4-OCF ₃	143
24	CH(CH ₃)CH ₂ SC ₂ H ₅	3-I	2-CH ₃ -4-Cl	161-166
25	CH(CH ₃)CH ₂ SC ₂ H ₅	3-F	2-CH ₃ -4-i-C ₃ F ₇	142
26	CH(CH ₃)CH ₂ SC ₂ H ₅	3-F	2-CH ₃ -4-C ₂ F ₅	Paste
27	CH(CH ₃)CH ₂ SC ₂ H ₅	3-F	2-CH ₃ -4-OCF ₃	142-147
28	CH(CH ₃)CH ₂ SOCH ₃	3-I	2-CH ₃ -4-C ₂ F ₅	94
29	CH(CH ₃)CH ₂ SO ₂ CH ₃	3-I	2-CH ₃ -4-C ₂ F ₅	100
30	CH(CH ₃)CH ₂ SOCH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	82
31	CH(CH ₃)CH ₂ SO ₂ CH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	134
32	CH(CH ₃)CH ₂ SCH ₃	3-I	2-CH ₃ -4-SCF ₃	194-195
33	CH(CH ₃)CH ₂ S-i-C ₄ H ₉	3-I	2-CH ₃ -4-i-C ₃ F ₇	164-172
34	CH(CH ₃)CH ₂ S-i-C ₄ H ₉	3-I	2-CH ₃ -4-C ₂ F ₅	159-160
35	CH(CH ₃)CH ₂ S-i-C ₄ H ₉	3-I	2-CH ₃ -4-OCF ₃	155-159
36	CH(CH ₂ SCH ₃) ₂	3-I	2-CH ₃ -4-C ₂ F ₅	145
37	CH(CH ₃)CH ₂ SCH ₃	3,4-Cl ₂	2-CH ₃ -4-OCF ₃	197-199
38	CH(CH ₃)CH ₂ SCH ₃	5,6-Cl ₂	2-CH ₃ -4-OCF ₃	213-214
39	CH(CH ₃)CH ₂ SCH ₃	3,4-Cl ₂	2-CH ₃ -4-C ₂ F ₅	221-222
40	CH(CH ₃)CH ₂ SCH ₃	5,6-Cl ₂	2-CH ₃ -4-C ₂ F ₅	199-200
41	CH(CH ₃)CH ₂ SCH ₃	3,4-Cl ₂	2-CH ₃ -4-i-C ₃ F ₇	215-216
42	CH(CH ₃)CH ₂ SCH ₃	5,6-Cl ₂	2-CH ₃ -4-i-C ₃ F ₇	220-221
43	CH(CH ₃)CH ₂ SCH ₃	4-Cl	2-CH ₃ -4-C ₂ F ₅	178-179
44	CH(CH ₃)CH ₂ SCH ₃	3,4-F ₂	2-CH ₃ -4-OCF ₃	175-176

Table 1 (Continued)

No	T ¹	(X) l	(Y) m	Property mp (°C)
45	CH(CH ₃)CH ₂ SCH ₃	4,5-F ₂	2-CH ₃ -4-OCF ₃	118-120
46	CH(CH ₃)CH ₂ SCH ₃	3-I	2-CH ₃ -4-OC- (C ₂ F ₅)=C(CF ₃) ₂	196-197
47	CH(CH ₃)CH ₂ SCH ₃	3-I	2-Cl-4-OCF ₂ -CHF0-5	198
48	CH(CH ₃)CH ₂ SCH ₃	3-I	2-Cl-4-OCHF-CF ₂ 0-5	192
49	CH(CH ₃)CH ₂ SCH ₃	3-I	2-OCH ₃ -4-C ₂ F ₅	170
50	CH(CH ₃)CH ₂ SCH ₃	3-I	2-C ₂ H ₅ -4-C ₂ F ₅	125
51	(CH ₂) ₂ SCH ₃	6-I	2-CH ₃ -4-OCF ₃	130-133
52	(CH ₂) ₂ SCH ₃	3-I	2-CH ₃ -4-OCF ₃	145-150
53	(CH ₂) ₂ SCH ₃	3-I	2-CH ₃ -4-C ₂ F ₅	Amorphous
54	(CH ₂) ₂ SCH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	Amorphous
55	(CH ₂) ₃ SCH ₃	3-I	2-CH ₃ -4-OCF ₃	144-147
56	(CH ₂) ₃ SCH ₃	3-I	2-CH ₃ -4-C ₂ F ₅	165-168
57	(CH ₂) ₃ SCH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	156-159
58	(CH ₂) ₂ S-i-C ₃ H ₇	3-I	2-CH ₃ -4-OCF ₃	189-192
59	(CH ₂) ₂ S-i-C ₃ H ₇	3-I	2-CH ₃ -4-C ₂ F ₅	153-155
60	(CH ₂) ₂ S-i-C ₃ H ₇	3-I	2-CH ₃ -4-i-C ₃ F ₇	158-160
61	CH(CH ₃)CH ₂ S-2-Py i	3-I	2-CH ₃ -4-C ₂ F ₅	Amorphous
62	CH(CH ₃)CH ₂ S-2-Py i	3-I	2-CH ₃ -4-i-C ₃ F ₇	140-142
63	CH(CH ₃)CH ₂ S-n-C ₄ H ₉	3-I	2-CH ₃ -4-OCF ₃	137-139
64	CH(CH ₃)CH ₂ S-n-C ₄ H ₉	3-I	2-CH ₃ -4-C ₂ F ₅	Amorphous
65	CH(CH ₃)CH ₂ SCH ₃	3-I	2-Cl-4-i-C ₃ F ₇	190

Table 1 (Continued)

No	T'	(X) l	(Y) m	Property mp (°C)
66	CH(CH ₃)CH ₂ SCH ₃	3-I	2-C ₂ H ₅ -4-i-C ₃ F ₇	205
67	CH(CH ₂ SCH ₃) ₂	3-I	2-CH ₃ -4-i-C ₃ F ₇	181
68	CH(CH ₂ SCH ₃) ₂	3-I	2-CH ₃ -4-OCF ₂ CHF ₂	169-176
69	CH(CH ₂ SCH ₃) ₂	3-I	2-CH ₃ -4-OCF ₃	131-139
70	CH(CH ₂ SCH ₃) ₂	3-I	2-CH ₃ -4-OCHF ₂	142
71	(CH ₂) ₂ SC ₂ H ₅	3-I	2-CH ₃ -4-OCF ₃	157-161
72	(CH ₂) ₂ SC ₂ H ₅	3-I	2-CH ₃ -4-C ₂ F ₅	152-155
73	(CH ₂) ₂ SC ₂ H ₅	3-I	2-CH ₃ -4-i-C ₃ F ₇	159-162
74	CH(CH ₃)CH ₂ S-2-Py i	3-I	2-CH ₃ -4-OCF ₃	203
75	CH(CH ₃)CH ₂ SO-2-Py i	3-I	2-CH ₃ -4-C ₂ F ₅	110-111
76	CH(CH ₃)CH ₂ SO ₂ -2-Py i	3-I	2-CH ₃ -4-i-C ₃ F ₇	99-100
77	CH(CH ₃)CH ₂ S-n-C ₆ H ₁₃	3-I	2-CH ₃ -4-OCF ₃	Amorphous
78	CH(CH ₃)CH ₂ S-n-C ₆ H ₁₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	152-153
79	CH(CH ₃)CH ₂ SCH ₃	3-Br	2-CH ₃ -4-i-C ₃ F ₇	201-202
80	CH(CH ₃)CH ₂ SCH ₃	3-Br	2-CH ₃ -4-OCF ₃	195
81	CH(CH ₃)CH ₂ SCH ₃	3-Br	2-CH ₃ -4-C ₂ F ₅	194-195
82	CH(CH ₃)CH ₂ S-c-C ₆ H ₁₁	3-I	2-CH ₃ -4-OCF ₃	166-167
83	CH(CH ₃)CH ₂ S-t-C ₄ H ₉	3-I	2-CH ₃ -4-OCF ₃	188-189
84	CH(CH ₃)CH ₂ S-t-C ₄ H ₉	3-I	2-CH ₃ -4-C ₂ F ₅	183-184
85	CH(CH ₃)CH ₂ S-c-C ₆ H ₁₁	3-I	2-CH ₃ -4-C ₂ F ₅	102-103
86	CH(CH ₃)CH ₂ S-c-C ₆ H ₁₁	3-I	2-CH ₃ -4-i-C ₃ F ₇	95-96
87	CH(CH ₃)CH ₂ SOCH ₃	3-Br	2-CH ₃ -4-OCF ₃	212-213

Table 1 (Continued)

No	T ¹	(X) l	(Y) m	Property mp (°C)
88	CH(CH ₃)CH ₂ SO ₂ CH ₃	3-Br	2-CH ₃ -4-OCF ₃	93
89	CH(Ph)CH ₂ SCH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	168-170
90	CH(Ph)CH ₂ SCH ₃	3-I	2-CH ₃ -4-C ₂ F ₅	157-159
91	CH(Ph)CH ₂ SCH ₃	3-I	2-CH ₃ -4-OCF ₃	178-180
92	CH(CH ₃)(CH ₂) ₃ SCH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	160-161
93	CH(CH ₃)(CH ₂) ₃ SCH ₃	3-I	2-CH ₃ -4-C ₂ F ₅	147-149
94	CH(CH ₃)(CH ₂) ₃ SCH ₃	3-I	2-CH ₃ -4-OCF ₃	183-185
95	CH(CH ₃)CH ₂ SOCH ₃	3-Br	2-CH ₃ -4-C ₂ F ₅	90
96	CH(CH ₃)CH ₂ SO ₂ CH ₃	3-Br	2-CH ₃ -4-C ₂ F ₅	95
97	CH(CH ₃)CH ₂ SO ₂ CH ₃	3-Br	2-CH ₃ -4-i-C ₃ F ₇	153-155
98	CH(CH ₃)CH ₂ SCH ₃	3-Cl	2-CH ₃ -4-OCF ₃	188-189
99	CH(CH ₃)CH ₂ SCH ₃	3-Cl	2-CH ₃ -4-i-C ₃ F ₇	202-203
100	CH(CH ₃)CH ₂ SO ₂ CH ₃	3-Cl	2-CH ₃ -4-OCF ₃	104-105
101	CH(CH ₃)CH ₂ SO ₂ CH ₃	3-Cl	2-CH ₃ -4-i-C ₃ F ₇	155-156
102	CH(CH ₃)CH ₂ SO ₂ CH ₃	3-I	2-Cl-4-OCHF ₂ CF ₂ O-5	198
103	CH(CH ₃)CH ₂ SO ₂ CH ₃	3-I	2-Cl-4-OCF ₂ CHF ₂ O-5	195
104	CH(CH ₃)CH ₂ SCH ₃	3-NO ₂	2-CH ₃ -4-OCF ₃	181
105	CH(CH ₃)CH ₂ SCH ₃	3-NO ₂	2-CH ₃ -4-C ₂ F ₅	190-193
106	CH(CH ₃)CH ₂ SCH ₃	3-NO ₂	2-CH ₃ -4-i-C ₃ F ₇	219
107	CH(CH ₃)CH ₂ SCH ₃	4-I	2-CH ₃ -4-OCF ₃	179
108	CH(CH ₃)CH ₂ SCH ₃	4-I	2-CH ₃ -4-C ₂ F ₅	204
109	CH(CH ₃)CH ₂ SCH ₃	4-I	2-CH ₃ -4-i-C ₃ F ₇	169-176

Table 1 (Continued)

No	T ¹	(X) l	(Y) m	Property mp (°C)
110	CH(CH ₃)CH ₂ SCH ₃	5-I	2-CH ₃ -4-OCF ₃	127-128
111	CH(CH ₃)CH ₂ SCH ₃	5-I	2-CH ₃ -4-C ₂ F ₅	143
112	CH(CH ₃)CH ₂ SCH ₃	5-I	2-CH ₃ -4-i-C ₃ F ₇	189
113	CH(CH ₃)CH ₂ SCH ₃	3-Cl	2-CH ₃ -4-C ₂ F ₅	189-190
114	CH(CH ₃)CH ₂ SO ₂ CH ₃	3-Cl	2-CH ₃ -4-C ₂ F ₅	84-87
115	CH(CH ₃)CH ₂ SCH ₃	6-Cl	2-CH ₃ -4-C ₂ F ₅	102-103
116	CH(CH ₃)CH ₂ SO ₂ CH ₃	6-Cl	2-CH ₃ -4-C ₂ F ₅	233-234
117	CH(CH ₃)CH ₂ S-t-C ₄ H ₉	3-I	2-CH ₃ -4-i-C ₃ F ₇	252-256
118	CH(CH ₃)CH ₂ SO ₂ -2-Py i	3-I	2-CH ₃ -4-C ₂ F ₅	95-100
119	CH(CH ₃)CH ₂ SO ₂ -2-Py i	3-I	2-CH ₃ -4-OCF ₃	92-93
120	CH(C ₂ H ₅)CH ₂ SCH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	190
121	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-CH ₃ -4-C ₂ F ₅	194-196
122	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	205-206
123	C(CH ₃) ₂ CH ₂ SO ₂ CH ₃	3-I	2-CH ₃ -4-C ₂ F ₅	88-90
124	C(CH ₃) ₂ CH ₂ SO ₂ CH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	88-90
125	C(CH ₃) ₂ CH ₂ SOCH ₃	3-I	2-CH ₃ -4-C ₂ F ₅	74-76
126	C(CH ₃) ₂ CH ₂ SOCH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	90-95
127	CH(C ₂ H ₅)(CH ₂) ₂ SCH ₃	3-I	2-CH ₃ -4-C ₂ F ₅	170
128	CH(C ₂ H ₅)(CH ₂) ₂ SCH ₃	3-I	2-CH ₃ -4-OCF ₃	175
129	CH(CH ₃)CH ₂ SCH ₃	3-SCF ₃	2-CH ₃ -4-C ₂ F ₅	201-203
130	CH(CH ₃)CH ₂ SCH ₃	3-SCF ₃	2-CH ₃ -4-i-C ₃ F ₇	176-178
131	CH(CH ₃)CH ₂ SCH ₃	3-SOCF ₃	2-CH ₃ -4-C ₂ F ₅	183-185

Table 1 (Continued)

No	T ¹	(X) l	(Y) m	Property mp (°C)
132	CH(CH ₃)CH ₂ SCH ₃	3-SOCF ₃	2-CH ₃ -4-i-C ₃ F ₇	154
133	CH(CH ₃)(CH ₂) ₃ SOCH ₃	3-I	2-CH ₃ -4-C ₂ F ₅	135
134	CH(CH ₃)(CH ₂) ₃ SO ₂ CH ₃	3-I	2-CH ₃ -4-C ₂ F ₅	163
135	CH(CH ₃)(CH ₂) ₃ SOCH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	172-175
136	CH(CH ₃)(CH ₂) ₃ SO ₂ CH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	204
137	CH(Ph)CH ₂ SOCH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	142
138	CH(Ph)CH ₂ SO ₂ CH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	203
139	CH(CH ₃)CH ₂ SO ₂ -l-C ₄ H ₉	3-I	2-CH ₃ -4-OCF ₃	90-92
140	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-CH ₃ -4-OCF ₃	172-173
141	C(CH ₃) ₂ CH ₂ SOCH ₃	3-I	2-CH ₃ -4-OCF ₃	146-147
142	C(CH ₃) ₂ CH ₂ SO ₂ CH ₃	3-I	2-CH ₃ -4-OCF ₃	86-88
143	CH(CH ₃)CH ₂ SOCH ₃	3-Cl	2-CH ₃ -4-OCF ₃	199-200
144	CH(CH ₃)CH ₂ SOCH ₃	3-Cl	2-CH ₃ -4-C ₂ F ₅	152-155
145	CH(CH ₃)CH ₂ SCH ₃	3-I	2-CH ₃ -4-s-C ₄ F ₉	120
146	CH(CH ₃)CH ₂ SCH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇ -5-F	210
147	CH(CH ₃)CH ₂ SCH ₃	3-Cl-4-F	2-CH ₃ -4-OCF ₃	188-190
148	CH(CH ₃)CH ₂ SCH ₃	3-Cl-4-F	2-CH ₃ -4-C ₂ F ₅	203-204
149	CH(CH ₃)CH ₂ SCH ₃	3-Cl-4-F	2-CH ₃ -4-i-C ₃ F ₇	226-227
150	CH(CH ₃)(CH ₂) ₃ SCH ₃	3-Cl	2-CH ₃ -4-C ₂ F ₅	124
151	CH(CH ₃)(CH ₂) ₃ SCH ₃	6-Cl	2-CH ₃ -4-C ₂ F ₅	Paste
152	CH(CH ₃)(CH ₂) ₃ SOCH ₃	3-Cl	2-CH ₃ -4-C ₂ F ₅	150

Table 1 (Continued)

No	T'	(X) l	(Y) m	Property mp (°C)
153	$\text{CH}(\text{CH}_3)(\text{CH}_2)_3\text{SO}_2\text{CH}_3$	3-Cl	2- CH_3 -4- C_2F_6	117
154	$\text{CH}(\text{CH}_3)(\text{CH}_2)_3\text{SCH}_3$	3-Cl	2- CH_3 -4-i- C_3F_7	125
155	$\text{CH}(\text{CH}_3)(\text{CH}_2)_3\text{SCH}_3$	6-Cl	2- CH_3 -4-i- C_3F_7	Paste
156	$\text{CH}(\text{CH}_3)(\text{CH}_2)_3\text{SO}_2\text{CH}_3$	3-Cl	2- CH_3 -4-i- C_3F_7	115
157	$\text{CH}(\text{CH}_3)\text{CH}_2\text{SCH}_3$	3-I	2- CH_3 -4- CF_3	187
158	$\text{CH}(\text{CH}_3)\text{CH}_2\text{SCH}_3$	3- OCH_2 -0-4	2- CH_3 -4- C_2F_6	110
159	$\text{CH}(\text{CH}_3)(\text{CH}_2)_2\text{SCH}_3$	3-Cl	2- CH_3 -4-i- C_3F_7	167-169
160	$\text{CH}(\text{CH}_3)(\text{CH}_2)_2\text{SCH}_3$	3-Cl	2- CH_3 -4- C_2F_6	169-171
161	$\text{CH}(\text{CH}_3)(\text{CH}_2)_2\text{SCH}_3$	3-Cl	2- CH_3 -4- OCF_3	183-184
162	$\text{CH}(\text{CH}_3)(\text{CH}_2)_2\text{SCH}_3$	3-I	2- CH_3 -4-i- C_3F_7	192-194
163	$\text{CH}(\text{CH}_3)(\text{CH}_2)_2\text{SCH}_3$	3-I	2- CH_3 -4- C_2F_6	200-201
164	$\text{CH}(\text{CH}_3)(\text{CH}_2)_2\text{SCH}_3$	3-I	2- CH_3 -4- OCF_3	193-194
165	$\text{CH}(\text{CH}_3)\text{CH}(\text{CH}_3)\text{SCH}_3$	3-I	2- CH_3 -4-i- C_3F_7	120
166	$\text{CH}(\text{CH}_3)\text{CH}(\text{CH}_3)\text{SO}_2\text{CH}_3$	3-I	2- CH_3 -4-i- C_3F_7	130
167	$\text{CH}(\text{CH}_3)\text{CH}(\text{CH}_3)\text{SC}_2\text{H}_5$	3-I	2- CH_3 -4-i- C_3F_7	105
168	$\text{CH}(\text{CH}_3)\text{CH}(\text{CH}_3)\text{SO}_2\text{C}_2\text{H}_5$	3-I	2- CH_3 -4-i- C_3F_7	105
169	$\text{C}(\text{CH}_3)_2\text{CH}_2\text{SCH}_3$	3-Cl	2- CH_3 -4-i- C_3F_7	199-200
170	$\text{C}(\text{CH}_3)_2\text{CH}_2\text{SCH}_3$	3-Br	2- CH_3 -4-i- C_3F_7	200-201
171	$\text{C}(\text{CH}_3)_2\text{CH}_2\text{SO}_2\text{CH}_3$	3-Cl	2- CH_3 -4-i- C_3F_7	86
172	$\text{C}(\text{CH}_3)_2\text{CH}_2\text{SOCH}_3$	3-Cl	2- CH_3 -4-i- C_3F_7	90
173	$\text{CH}(\text{CH}_3)(\text{CH}_2)_4\text{SCH}_3$	3-I	2- CH_3 -4- C_2F_6	156

Table 1 (Continued)

No	T'	(X) l	(Y) m	Property mp (°C)
174	CH(CH ₃)(CH ₂) ₄ SCH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	174
175	CH(CH ₃)(CH ₂) ₄ SC ₂ H ₅	3-I	2-CH ₃ -4-C ₂ F ₅	147
176	CH(CH ₃)(CH ₂) ₄ SC ₂ H ₅	3-I	2-CH ₃ -4-i-C ₃ F ₇	168
177	CH(CH ₃)(CH ₂) ₄ SOC ₂ H ₅	3-I	2-CH ₃ -4-C ₂ F ₅	115
178	CH(CH ₃)(CH ₂) ₄ SOC ₂ H ₅	3-I	2-CH ₃ -4-i-C ₃ F ₇	120
179	CH(CH ₃)(CH ₂) ₄ SO ₂ C ₂ H ₅	3-I	2-CH ₃ -4-C ₂ F ₅	131
180	CH(CH ₃)(CH ₂) ₄ SO ₂ C ₂ H ₅	3-I	2-CH ₃ -4-i-C ₃ F ₇	145
181	C(CH ₃) ₂ CH ₂ SO ₂ CH ₃	3-Br	2-CH ₃ -4-i-C ₃ F ₇	90-93
182	C(CH ₃) ₂ CH ₂ SOCH ₃	3-Br	2-CH ₃ -4-i-C ₃ F ₇	212-213
183	C(CH ₃) ₂ CH ₂ SC ₂ H ₅	3-I	2-CH ₃ -4-i-C ₃ F ₇	160-162
184	C(CH ₃) ₂ CH ₂ SOC ₂ H ₅	3-I	2-CH ₃ -4-i-C ₃ F ₇	78-82
185	C(CH ₃) ₂ CH ₂ SC ₂ H ₅	3-Cl	2-CH ₃ -4-i-C ₃ F ₇	132-134
186	C(CH ₃) ₂ CH ₂ SO ₂ C ₂ H ₅	3-Cl	2-CH ₃ -4-i-C ₃ F ₇	68
187	C(CH ₃) ₂ CH ₂ SC ₂ H ₅	3-Br	2-CH ₃ -4-i-C ₃ F ₇	169-170
188	CH(CH ₃)CH ₂ S(CH ₂) ₂ SCH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	169-171
189	CH(CH ₃)CH ₂ S(CH ₂) ₂ SCH ₃	3-I	2-CH ₃ -4-C ₂ F ₅	135-137
190	CH(CH ₃)CH ₂ S(CH ₂) ₂ SCH ₃	3-I	2-CH ₃ -4-OCF ₃	159-161
191	CH(CH ₃)CH ₂ SCH ₃	3-SO ₂ -CH ₃	2-CH ₃ -4-i-C ₃ F ₇	205-206
192	CH(CH ₃)CH ₂ SCH ₃	6-SO ₂ -CH ₃	2-CH ₃ -4-i-C ₃ F ₇	210-212

Table 1 (Continued)

No	T ¹	(X) l	(Y) m	Property mp (°C)
193	CH(CH ₃)CH ₂ SOCH ₃	3, 4 -Cl ₂	2-CH ₃ -4-OCF ₃	198-201
194	CH(CH ₃)CH ₂ SO ₂ CH ₃	3, 4 -Cl ₂	2-CH ₃ -4-OCF ₃	165-167
195	CH(CH ₃)(CH ₂) ₂ SOCH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	123-125
196	CH(CH ₃)(CH ₂) ₂ SO ₂ CH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	128-130
197	CH(CH ₃)(CH ₂) ₄ SO ₂ CH ₃	3-I	2-CH ₃ -4-C ₂ F ₆	145
198	CH(CH ₃)(CH ₂) ₄ SO ₂ CH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	160
199	CH(CH ₃)(CH ₂) ₃ SC ₂ H ₅	3-I	2-CH ₃ -4-C ₂ F ₆	143
200	CH(CH ₃)(CH ₂) ₃ SO ₂ C ₂ H ₅	3-I	2-CH ₃ -4-C ₂ F ₆	117
201	CH(CH ₃)(CH ₂) ₃ SC ₂ H ₅	3-I	2-CH ₃ -4-i-C ₃ F ₇	150
202	CH(CH ₃)(CH ₂) ₃ SOC ₂ H ₅	3-I	2-CH ₃ -4-i-C ₃ F ₇	106
203	CH(CH ₃)(CH ₂) ₃ SO ₂ C ₂ H ₅	3-I	2-CH ₃ -4-i-C ₃ F ₇	117
204	Q ¹	3-I	2-CH ₃ -4-i-C ₃ F ₇	202
205	Q ²	3-I	2-CH ₃ -4-i-C ₃ F ₇	249
206	CH(CH ₃)CH ₂ SCH ₂ CH=CH ₂	3-I	2-CH ₃ -4-i-C ₃ F ₇	168-175
207	CH ₂ CH(CH ₃)SC ₂ H ₅	3-I	2-CH ₃ -4-i-C ₃ F ₇	150
208	CH ₂ CH(CH ₃)SO ₂ C ₂ H ₅	3-I	2-CH ₃ -4-i-C ₃ F ₇	130
209	CH ₂ CH(CH ₃)SC ₂ H ₅	6-I	2-CH ₃ -4-i-C ₃ F ₇	155
210	CH(CH ₃)CH ₂ SCH ₃	3-OCF ₃	2-CH ₃ -4-i-C ₃ F ₇	184-185
211	CH(CH ₃)(CH ₂) ₂ SOCH ₃	3-Cl	2-CH ₃ -4-i-C ₃ F ₇	Amorphous
212	CH(CH ₃)(CH ₂) ₂ SO ₂ CH ₃	3-Cl	2-CH ₃ -4-i-C ₃ F ₇	108-111

Table 1 (Continued)

No	T'	(X) l	(Y) m	Property mp (°C)
213	CH(CH ₃)(CH ₂) ₃ SC ₂ H ₅	3-Br	2-CH ₃ -4-i-C ₃ F ₇	151
214	CH(CH ₃)(CH ₂) ₃ SOC ₂ H ₅	3-Br	2-CH ₃ -4-i-C ₃ F ₇	159
215	CH(CH ₃)(CH ₂) ₃ SO ₂ C ₂ H ₅	3-Br	2-CH ₃ -4-i-C ₃ F ₇	150
216	(S)-C* H(CH ₃)CH ₂ SCH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	212-214
217	(R)-C* H(CH ₃)CH ₂ SCH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	214-216
218	C(CH ₃) ₂ CH ₂ SOC ₂ H ₅	3-Br	2-CH ₃ -4-i-C ₃ F ₇	107-110
219	C(CH ₃) ₂ CH ₂ S-n-C ₃ H ₇	3-I	2-CH ₃ -4-i-C ₃ F ₇	169-170
220	C(CH ₃) ₂ CH ₂ SO-n-C ₃ H ₇	3-I	2-CH ₃ -4-i-C ₃ F ₇	88-90
221	C(CH ₃) ₂ CH ₂ SO ₂ -n-C ₃ H ₇	3-I	2-CH ₃ -4-i-C ₃ F ₇	88-90
222	CH(CH ₃)CH ₂ SCH ₃	3-Cl-4 -OCH ₃	2-CH ₃ -4-i-C ₃ F ₇	122-125
223	CH(CH ₃)CH ₂ SCH ₃	3-NO ₂	2-CH ₃ -4 -OCF ₂ CHFCF ₃	218
224	CH(CH ₃)CH ₂ SCH ₃	3-NO ₂	2-CH ₃ -4-O-(3- Cl-5-CF ₃ -2-Py i	188
225	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-Cl-4-OCF ₃	166
226	C(CH ₃) ₂ CH ₂ SO ₂ CH ₃	3-I	2-Cl-4-OCF ₃	141
227	C(CH ₃) ₂ CH ₂ SCH ₃	3-Br	2-Cl-4-OCF ₃	160
228	C(CH ₃) ₂ CH ₂ SO ₂ CH ₃	3-Br	2-Cl-4-OCF ₃	133
229	C(CH ₃) ₂ (CH ₂) ₃ SCH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	164
230	C(CH ₃) ₂ (CH ₂) ₂ SCH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	108

Table 1 (Continued)

No	T ¹	(X) l	(Y) m	Property mp (°C)
231	$C(CH_3)_2(CH_2)_2CH(CH_3)-SCH_3$	3-I	2-CH ₃ -4-i-C ₃ F ₇	151
232	$C(CH_3)_2CH_2SOCH_3$	3-Br	2-Cl-4-OCF ₃	132
233	$CH(CH_3)CH_2SCH_3$	3-I	2-Cl-4-OCF ₃	172
234	$CH(CH_3)CH_2SO_2CH_3$	3-I	2-Cl-4-OCF ₃	168
235	$C(CH_3)_2CH_2SC_3H_7-n$	3-Br	2-CH ₃ -4-i-C ₃ F ₇	162-163
236	$C(CH_3)_2CH_2SC_3H_7-n$	3-Cl	2-CH ₃ -4-i-C ₃ F ₇	149-150
237	$C(CH_3)_2CH_2SO_2C_3H_7-n$	3-Br	2-CH ₃ -4-i-C ₃ F ₇	176-180
238	$C(CH_3)_2CH_2SO_2C_3H_7-n$	3-Cl	2-CH ₃ -4-i-C ₃ F ₇	202-203
239	$CH_2CH(CH_3)SCH_3$	3-I	2-CH ₃ -4-i-C ₃ F ₇	200
240	$CH_2CH(CH_3)SO_2CH_3$	3-I	2-CH ₃ -4-i-C ₃ F ₇	130
241	$CH(CH_3)CH_2SO_2CH_3$	3-OCF ₃	2-CH ₃ -4-i-C ₃ F ₇	226-228
242	$C(CH_3)_2CH_2SC_2H_5$	3-I	2-Cl-4-OCF ₃	163
243	$CH(CH_3)CH_2SOCH_3$	3,4-Cl ₂	2-CH ₃ -4-i-C ₃ F ₇	138-139
244	$CH(CH_3)CH_2SO_2CH_3$	3,4-Cl ₂	2-CH ₃ -4-i-C ₃ F ₇	146-148
245	$CH(CH_3)CH_2SCH_3$	3-CF ₃	2-CH ₃ -4-i-C ₃ F ₇	209
246	$CH(CH_3)CH_2SOCH_3$	3-Cl	2-CH ₃ -4-i-C ₃ F ₇	110-112
247	$C(CH_3)_2CH_2SC_2H_5$	3-I	2-CH ₃ -4-C ₂ F ₅	188-189
248	$C(CH_3)_2CH_2SO_2C_2H_5$	3-I	2-CH ₃ -4-C ₂ F ₅	120-122
249	$C(CH_3)_2CH_2SOC_2H_5$	3-I	2-CH ₃ -4-C ₂ F ₅	125-126
250	$C(CH_3)_2CH_2SO_2C_2H_5$	3-I	2-CH ₃ -4-OCF ₃	125(Rf=great)
251	$C(CH_3)_2CH_2SO_2C_2H_5$	3-I	2-CH ₃ -4-OCF ₃	146(Rf=small)

Table 1 (Continued)

No	T ¹	(X) l	(Y) m	Property mp (°C)
252	C(CH ₃) ₂ CH ₂ SCH ₃	3-OCH ₂ O-4	2-CH ₃ -4-OCF ₃	220
253	CH(CH ₃)CH ₂ SOCH ₃	3-OCF ₃	2-CH ₃ -4-i-C ₃ F ₇	220
254	CH(CH ₃)CH ₂ SOCH ₃	3-CF ₃	2-CH ₃ -4-i-C ₃ F ₇	223
255	CH(CH ₃)CH ₂ SO ₂ CH ₃	3-CF ₃	2-CH ₃ -4-i-C ₃ F ₇	199-201
256	CH(CH ₃)(CH ₂) ₂ SC ₂ H ₅	3-Cl	2-CH ₃ -4-i-C ₃ F ₇	110-113
257	CH(CH ₃)(CH ₂) ₂ SC ₂ H ₅	3-I	2-CH ₃ -4-i-C ₃ F ₇	173-174
258	Q ⁵	3-I	2-CH ₃ -4-OCF ₃	183
259	Q ⁶	3-I	2-CH ₃ -4-i-C ₃ F ₇	149
260	CH(CH ₃)CH ₂ SOC ₂ H ₅	3-I	2-CH ₃ -4-i-C ₃ F ₇	96
261	CH(CH ₃)CH ₂ SO ₂ C ₂ H ₅	3-I	2-CH ₃ -4-i-C ₃ F ₇	98
262	CH(CH ₃)CH ₂ SC ₂ H ₅	3-Br	2-CH ₃ -4-i-C ₃ F ₇	155
263	CH(CH ₃)CH ₂ SOC ₂ H ₅	3-Br	2-CH ₃ -4-i-C ₃ F ₇	96
264	CH(CH ₃)CH ₂ SO ₂ C ₂ H ₅	3-Br	2-CH ₃ -4-i-C ₃ F ₇	135
265	CH(CH ₃)CH ₂ SC ₂ H ₅	3-Cl	2-CH ₃ -4-i-C ₃ F ₇	145
266	CH(CH ₃)CH ₂ SOC ₂ H ₅	3-Cl	2-CH ₃ -4-i-C ₃ F ₇	92
267	CH(CH ₃)CH ₂ SO ₂ C ₂ H ₅	3-Cl	2-CH ₃ -4-i-C ₃ F ₇	135
268	CH(CH ₃)CH ₂ SCH ₃	3-Br	2-CH ₃ -4-CF ₃	170-172
269	CH(CH ₃)(CH ₂) ₂ SOC ₂ H ₅	3-I	2-CH ₃ -4-i-C ₃ F ₇	132-134
270	CH(CH ₃)(CH ₂) ₂ SO ₂ C ₂ H ₅	3-I	2-CH ₃ -4-i-C ₃ F ₇	108-110
271	CH(CH ₃)CH ₂ SC ₃ H ₇ -n	3-Cl	2-CH ₃ -4-i-C ₃ F ₇	174
272	C(CH ₃) ₂ (CH ₂) ₂ SC ₂ H ₅	3-I	2-CH ₃ -4-i-C ₃ F ₇	171
273	Q ⁷	3-I	2-CH ₃ -4-i-C ₃ F ₇	184

Table 1 (Continued)

No	T ⁱ	(X) l	(Y) m	Property mp (°C)
274	CH(CH ₃) (CH ₂) ₂ SO ₂ C ₂ H ₅	3-Cl	2-CH ₃ -4-i-C ₃ F ₇	128-130
275	CH(CH ₃) (CH ₂) ₂ SO ₂ C ₂ H ₅	3-Cl	2-CH ₃ -4-i-C ₃ F ₇	105-106
276	CH(CH ₃) CH ₂ SCH ₃	3-Cl	2-CH ₃ -4-CF ₃	158-160
277	CH(CH ₃) CH ₂ SO ₂ CH ₃	3-Br	2-CH ₃ -4-CF ₃	118-120
278	C(CH ₃) ₂ CH ₂ SCH ₃	3-OCF ₂ O-4	2-CH ₃ -4-i-C ₃ F ₇	182
279	CH(CH ₃) CH ₂ S-Py i	3-I	2-CH ₃ -4-i-C ₃ F ₇	126
280	C(CH ₃) ₂ (CH ₂) ₃ SC ₂ H ₅	3-I	2-CH ₃ -4-OCF ₃	170
281	C(CH ₃) ₂ (CH ₂) ₃ SCH ₃	3-Br, 6-Br	2-CH ₃ -4-i-C ₃ F ₇	111
282	C(CH ₃) ₂ (CH ₂) ₃ SC ₂ H ₅	3-Br, 6-Br	2-CH ₃ -4-i-C ₃ F ₇	Mixture 121
283	CH(CH ₃) CH ₂ SO ₂ CH ₃	3-Cl	2-CH ₃ -4-CF ₃	Mixture 179-181
284	CH(CH ₃) CH ₂ SO ₂ CH ₃	3-I	2-CH ₃ -4-CF ₃	196-198
285	CH(CH ₃) CH ₂ SCH ₂ CF ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	216
286	CH(CH ₃) CH ₂ S (CH ₂) ₂ -OCOCF ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	158-159
287	CH(CH ₃) CH ₂ S-C ₃ H ₇ -n	3-Br	2-CH ₃ -4-i-C ₃ F ₇	111
288	CH(CH ₃) CH ₂ SCH ₃	3-OCF ₂ O-4	2-CH ₃ -4-i-C ₃ F ₇	196
289	CH(CH ₃) CH ₂ SO ₂ CH ₃	3-OCF ₂ O-4	2-CH ₃ -4-i-C ₃ F ₇	223
290	CH(CH ₃) CH ₂ SCH ₃	3-OCF ₂ O-4	2-CH ₃ -4-OCF ₃	191
291	CH(CH ₃) CH ₂ SOCH ₃	3-OCF ₂ O-4	2-CH ₃ -4-OCF ₃	187
292	C(CH ₃) ₂ CH ₂ SCH ₃	3-OCF ₂ O-4	2-CH ₃ -4-OCF ₃	205

Table 1 (Continued)

No	T'	(X) l	(Y) m	Property mp (°C)
293	$C(CH_3)_2CH_2SO_2CH_3$	3-OCF ₂ O-4	2-CH ₃ -4-OCF ₃	218
294	$CH(CH_3)CH_2SOCH_2CF_3$	3-I	2-CH ₃ -4-i-C ₃ F ₇	207-209
295	$CH(CH_3)CH_2SO_2CH_2CF_3$	3-I	2-CH ₃ -4-i-C ₃ F ₇	220-222
296	$CH(CH_3)CH_2S(CH_2)_2OH$	3-I	2-CH ₃ -4-i-C ₃ F ₇	157-159
297	$CH(CH_3)CH_2S(CH_2)_2$ -OC ₂ H ₅	3-I	2-CH ₃ -4-i-C ₃ F ₇	165-167
298	CH_2SCH_3	H	2-CH ₃ -4-i-C ₃ F ₇	157-159
299	$CH(CH_3)CH_2S-2-(3, 5$ -(CH ₃) ₂ -Pym)	3-I	2-CH ₃ -4-i-C ₃ F ₇	147-149
300	$CH(CH_3)CH_2SO-2-(3, 5$ -(CH ₃) ₂ -Pym)	3-I	2-CH ₃ -4-i-C ₃ F ₇	126-128
301	$CH(CH_3)CH_2SO_2-2-(3, 5$ -(CH ₃) ₂ -Pym)	3-I	2-CH ₃ -4-i-C ₃ F ₇	134-136
302	$CH(CH_3)CH_2SC(=S)$ -N(CH ₃) ₂	3-I	2-CH ₃ -4-i-C ₃ F ₇	Paste
303	$CH(CH_3)CH_2SCH_3$	3-I	2-CH ₃ -3-C ₂ F ₅	223-225
304	$CH(CH_3)CH_2SCH_3$	3-I	2-CH ₃ -5-C ₂ F ₅	215-218
305	$CH(CH_3)CH_2SCH_3$	3-Cl	2-CH ₃ -4-CF ₃	179-181
306	$CH(CH_3)CH_2SCH_3$	3-Br	2-CH ₃ -4-CF ₃	176-177
307	$CH(CH_3)CH_2SCH_3$	3-I	2-CH ₃ -4-CF ₃	184-186
308	$CH(CH_3)CH_2SCH_3$	3-N=C(t- C ₄ H ₉)O-4	2-CH ₃ -4-i-C ₃ F ₇	113

Table 1 (Continued)

No	T'	(X) I	(Y) III	Property mp (°C)
309	CH(CH ₃)CH ₂ SC ₂ H ₅	3-I	2-CH ₃ -4-CF ₃	193-194
310	C(CH ₃) ₂ CH ₂ SO ₂ CH ₃	3-Cl	2-CH ₃ -4-CF ₃	174-175
311	C(CH ₃) ₂ CH ₂ SOCH ₃	3-Br	2-CH ₃ -4-CF ₃	85-88
312	C(CH ₃) ₂ CH ₂ SO ₂ CH ₃	3-Br	2-CH ₃ -4-CF ₃	151-153
313	C(CH ₃) ₂ CH ₂ SOCH ₃	3-I	2-CH ₃ -4-CF ₃	102-104
314	C(CH ₃) ₂ CH ₂ SO ₂ CH ₃	3-I	2-CH ₃ -4-CF ₃	153-155
315	CH(CH ₃)CH ₂ S(CH ₂) ₂ -OCH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	154-155
316	CH(CH ₃)CH ₂ S(CH ₂) ₂ -CO ₂ CH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	160-162
317	CH(CH ₃)CH ₂ SO(CH ₂) ₂ -OC ₂ H ₅	3-I	2-CH ₃ -4-i-C ₃ F ₇	116-118
318	CH(CH ₃)CH ₂ SO ₂ (CH ₂) ₂ -OC ₂ H ₅	3-I	2-CH ₃ -4-i-C ₃ F ₇	138-140
319	CH(CH ₃)CH ₂ S-Bzl	3-I	2-CH ₃ -4-i-C ₃ F ₇	179-181
320	C(CH ₃) ₂ CH ₂ SO ₂ CH ₃	3-Br	2-CH ₃ -4-OCF ₃	Crystal
321	C(CH ₃) ₂ CH ₂ SCH ₃	3-Br	2-CH ₃ -4-OCF ₃	178
322	C(CH ₃) ₂ CH ₂ SCH ₃	3-NO ₂	2-CH ₃ -4-OCF ₃	189
323	C(CH ₃) ₂ CH ₂ SCH ₃	3-NO ₂	2-Cl-4-CH ₃	204
324	C(CH ₃) ₂ CH ₂ SCH ₃	3-NO ₂	2-CH ₃ -4-Br	208
325	C(CH ₃) ₂ CH ₂ SCH ₃	3-NO ₂	2-CH ₃ -4-i-C ₃ F ₇	234
326	C(CH ₃) ₂ CH ₂ SCH ₃	3-NO ₂	2,4-Cl ₂	178

Table 1 (Continued)

No	T'	(X) l	(Y) m	Property mp (°C)
327	$C(CH_3)_2CH_2SOCH_3$	3-NO ₂	2-CH ₃ -4-i-C ₃ F ₇	143
328	$C(CH_3)_2CH_2SO_2CH_3$	3-NO ₂	2-CH ₃ -4-i-C ₃ F ₇	197
329	Q ⁸	3-I	2-CH ₃ -4-i-C ₃ F ₇	183
330	$CH(CH_3)CH_2SOCH_3$	3-Br	2-CH ₃ -4-i-C ₃ F ₇	118
331	$(CH_2)_2SH$	H	2-CH ₃ -4-i-C ₃ F ₇	170
332	$CH(CH_3)CH_2SCH_3$	4-CH=CH-CH =CH-5	2-CH ₃ -4-i-C ₃ F ₇	158
333	$CH(CH_3)CH_2SCH_3$	3-CH=CH-CH =CH-4	2-CH ₃ -4-i-C ₃ F ₇	194
334	$CH(CH_3)CH_2SOCH_3$	3-CH=CH-CH =CH-4	2-CH ₃ -4-i-C ₃ F ₇	115
335	$CH(CH_3)CH_2SO_2CH_3$	3-CH=CH-CH =CH-4	2-CH ₃ -4-i-C ₃ F ₇	121
336	$CH(CH_3)CH_2SCH_3$	3-CH=CH-CH =CH-4	2-CH ₃ -4-OCF ₃	186
337	$CH(CH_3)CH_2SCH_3$	3-Br	2-Cl-4-OCF ₃	155
338	$CH(CH_3)CH_2SOCH_3$	3-Br	2-Cl-4-OCF ₃	174
339	$CH(CH_3)CH_2SO_2CH_3$	3-Br	2-Cl-4-OCF ₃	164
340	$CH(CH_3)CH_2SO(CH_2)_2$ -OCH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	90-93
341	$CH(CH_3)CH_2SO_2(CH_2)_2$ -OCH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	177-178

Table 1 (Continued)

No	T ¹	(X) I	(Y) m	Property mp (°C)
342	CH(CH ₃)CH ₂ SO(CH ₂) ₂ -CO ₂ CH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	144-147
343	CH(CH ₃)CH ₂ SO ₂ (CH ₂) ₂ -CO ₂ CH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	201-202
344	CH(CH ₃)CH ₂ SO-2-Bzt	3-I	2-CH ₃ -4-i-C ₃ F ₇	133-135
345	CH(CH ₃)CH ₂ SO ₂ -2-Bzt	3-I	2-CH ₃ -4-i-C ₃ F ₇	147-149
346	CH(CH ₃)CH ₂ SC ₂ H ₅	3-OCF ₃	2-CH ₃ -4-i-C ₃ F ₇	189-190
347	CH(CH ₃)CH ₂ SC ₂ H ₅	5-OCF ₃	2-CH ₃ -4-i-C ₃ F ₇	190-192
348	CH(CH ₃)CH ₂ SCH ₃	3-CF ₃	2-CH ₃ -4-i-C ₃ F ₇	220-221
349	CH(CH ₃)CH ₂ SC ₂ H ₅	3-CF ₃	2-CH ₃ -4-i-C ₃ F ₇	200-202
350	(CH ₂) ₂ SC(=S)NHC ₂ H ₅	H	2-CH ₃ -4-i-C ₃ F ₇	129
351	CH(CH ₃)CH ₂ SCH ₃	3-OCF ₂ CF ₂ O -4	2-CH ₃ -4-i-C ₃ F ₇	216
352	CH(CH ₃)CH ₂ S-2-Thz	3-I	2-CH ₃ -4-i-C ₃ F ₇	180
353	CH(CH ₃)CH ₂ S-2-(5-CH ₃ -1, 3, 4-Thd)	3-I	2-CH ₃ -4-i-C ₃ F ₇	122-124
354	CH(CH ₃)CH ₂ S-2-(5-CH ₃ -1, 3, 4-Thd)	6-I	2-CH ₃ -4-i-C ₃ F ₇	148-150
355	C(CH ₃) ₂ CH ₂ SCH ₃	3-OCF ₃	2-CH ₃ -4-i-C ₃ F ₇	208-209
356	C(CH ₃) ₂ CH ₂ SCH ₃	5-OCF ₃	2-CH ₃ -4-i-C ₃ F ₇	225
357	CH(CH ₃)CH ₂ SO ₂ C ₂ H ₅	3-OCF ₃	2-CH ₃ -4-i-C ₃ F ₇	219-220
358	C(CH ₃) ₂ CH ₂ SO ₂ CH ₃	3-CF ₃	2-CH ₃ -4-i-C ₃ F ₇	159-161

Table 1 (Continued)

No	T ¹	(X) l	(Y) m	Property mp (°C)
359	CH(CH ₃)CH ₂ SO ₂ C ₂ H ₅	3-CF ₃	2-CH ₃ -4-i-C ₃ F ₇	218-219
360	C(CH ₃) ₂ CH ₂ SO ₂ CH ₃	3-OCF ₃	2-CH ₃ -4-i-C ₃ F ₇	168-170
361	CH(CH ₃)CH ₂ SCH ₂ CO -N(C ₂ H ₅) ₂	3-I	2-CH ₃ -4-i-C ₃ F ₇	130-131
362	CH(CH ₃)CH ₂ SOCH ₂ CO -N(C ₂ H ₅) ₂	3-I	2-CH ₃ -4-i-C ₃ F ₇	95-98
363	CH(CH ₃)CH ₂ SO ₂ CH ₂ CO -N(C ₂ H ₅) ₂	3-I	2-CH ₃ -4-i-C ₃ F ₇	197-199
364	CH(CH ₃)CH ₂ SO ₂ -2-Thz	3-I	2-CH ₃ -4-i-C ₃ F ₇	153-155
365	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-CH ₂ OH -4-i-C ₃ F ₇	188-191
366	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-CH ₃ -3-F -4-i-C ₃ F ₇	218-221
367	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-CH ₃ -4-n-C ₄ F ₉	170-174
368	CH(CH ₃)CH ₂ SCH ₃	3-I	2-CH ₃ -4-Si(CH ₃) ₃	203-207
369	C(CH ₃) ₂ CH ₂ SCH ₃	3-Cl	2-Cl-4-OCF ₃	154
370	C(CH ₃) ₂ CH ₂ SOCH ₃	3-Cl	2-Cl-4-OCF ₃	73
371	C(CH ₃) ₂ CH ₂ SO ₂ CH ₃	3-Cl	2-Cl-4-OCF ₃	149
372	CH(CH ₃)CH ₂ SCH ₃	3-Cl-4-CH ₃	2-CH ₃ -4-i-C ₃ F ₇	189
373	C(CH ₃) ₂ CH ₂ SCH ₃	3-NO ₂	2-CH ₃ -4-C ₂ F ₅	218
374	C(CH ₃) ₂ CH ₂ SOCH ₃	3-NO ₂	2-CH ₃ -4-C ₂ F ₆	194

Table 1 (Continued)

No	T'	(X) l	(Y) m	Property mp (°C)
375	$C(CH_3)_2CH_2SO_2CH_3$	3-NO ₂	2-CH ₃ -4-C ₂ F ₅	210
376	$C(CH_3)_2CH_2SCH_3$	3-NO ₂	2-Cl-4-OCF ₃	181
377	$C(CH_3)_2CH_2SOCH_3$	3-NO ₂	2-Cl-4-OCF ₃	185
378	$C(CH_3)_2CH_2SO_2CH_3$	3-NO ₂	2-Cl-4-OCF ₃	186
379	$CH(CH_3)CH_2SO_2CH_3$	3-Cl-4-CH ₃	2-CH ₃ -4-i-C ₃ F ₇	158-159
380	$CH(CH_3)CH_2SCH_3$	3-Cl	2-Cl-4-OCF ₃	164
381	$CH(CH_3)CH_2SOCH_3$	3-Cl	2-Cl-4-OCF ₃	172
382	$CH(CH_3)CH_2SO_2CH_3$	3-Cl	2-Cl-4-OCF ₃	153
383	$CH(CH_3)CH_2SSCH_3$	3-Cl	2-CH ₃ -4-i-C ₃ F ₇	92
384	$CH(CH_3)CH_2SS$ -(2-NO ₂ -Ph)	3-Cl	2-CH ₃ -4-i-C ₃ F ₇	91
385	$C(CH_3)_2CH_2SCH_3$	3-F	2-Cl-4-OCF ₃	148
386	$C(CH_3)_2CH_2SOCH_3$	3-F	2-Cl-4-OCF ₃	102
387	$C(CH_3)_2CH_2SO_2CH_3$	3-F	2-Cl-4-OCF ₃	163
388	$CH(CH_3)CH_2SOCH_3$	3-NO ₂	2-CH ₃ -4-i-C ₃ F ₇	218
389	$CH(CH_3)CH_2SOCH_3$	3-NO ₂	2-CH ₃ -4-OCF ₃	218
390	$CH(CH_3)CH_2SOCH_3$	3-NO ₂	2-CH ₃ -4-CF ₃	243
391	$CH(CH_3)CH_2SOCH_3$	3-NO ₂	2-CH ₃ -4-C ₂ F ₅	210
392	$CH(CH_3)CH_2SH$	3-I	2-CH ₃ -4-i-C ₃ F ₇	226
393	$CH(CH_3)CH_2SCH_3$	3-I	2-CH ₃ -4-OCF ₂ -CHFOCF ₃	192-193

Table 1 (Continued)

No	T ¹	(X) l	(Y) m	Property mp (°C)
394	CH(CH ₃)CH ₂ SOCH ₃	3-I	2-CH ₃ -4-OCF ₂ -CHFOCF ₃	206-208
395	CH(CH ₃)CH ₂ SO ₂ CH ₃	3-I	2-CH ₃ -4-OCF ₂ -CHFOCF ₃	166-167
396	CH(CH ₃)CH ₂ SCH ₃	3-I	2-CH ₃ -4-OCF ₂ -CHFOC ₃ F _{7-n}	175-176
397	CH(CH ₃)CH ₂ SCH ₃	3-I	2-CH ₃ -4-0-(3-Cl -5-CF ₃ -2-Pyi)	195-197
398	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-CH ₃ -4-0-(3-Cl -5-CF ₃ -2-Pyi)	180-181
399	C(CH ₃) ₂ CH ₂ SC ₃ H _{7-i}	3-I	2-CH ₃ -4-i-C ₃ F ₇	85-88
400	C(CH ₃) ₂ CH ₂ SC ₄ H _{9-t}	3-I	2-CH ₃ -4-i-C ₃ F ₇	95-98
401	C(CH ₃) ₂ CH ₂ SOC ₄ H _{9-t}	3-I	2-CH ₃ -4-i-C ₃ F ₇	100-104
402	C(CH ₃) ₂ CH ₂ SOC ₃ H _{7-i}	3-I	2-CH ₃ -4-i-C ₃ F ₇	100-104
403	CH(CH ₃)CH ₂ S-2-Pyi	3-Br	2-CH ₃ -4-i-C ₃ F ₇	93
404	CH(CH ₃)CH ₂ SO-2-Pyi	3-Br	2-CH ₃ -4-i-C ₃ F ₇	137
405	CH(CH ₃)CH ₂ SO ₂ -2-Pyi	3-Br	2-CH ₃ -4-i-C ₃ F ₇	96
406	C(CH ₃) ₂ CH ₂ SOCH ₃	3-I	2-CH ₃ -4-0-(3-Cl -5-CF ₃ -2-Pyi)	105-108
407	C(CH ₃) ₂ CH ₂ SO ₂ CH ₃	3-I	2-CH ₃ -4-0-(3-Cl -5-CF ₃ -2-Pyi)	135-136

Table 1 (Continued)

No	T ¹	(X) l	(Y) m	Property mp (°C)
408	CH(CH ₃)CH ₂ SOCH ₃	3-I	2-CH ₃ -4-OCF ₂ -CHFOC ₃ F ₇ -n	179-181
409	CH(CH ₃)CH ₂ SO ₂ CH ₃	3-I	2-CH ₃ -4-OCF ₂ -CHFOC ₃ F ₇ -n	196-198
410	CH(CH ₃)CH ₂ SOCH ₃	3-I	2-CH ₃ -4-0-(3-Cl -5-CF ₃ -2-Py i)	176-179
411	CH(CH ₃)CH ₂ SO ₂ CH ₃	3-I	2-CH ₃ -4-0-(3-Cl -5-CF ₃ -2-Py i)	199-201
412	C(CH ₃) ₂ CH ₂ SOCH ₃	3-I	2-CH ₃ -3-F-4-i-C ₃ F ₇	120-125
413	C(CH ₃) ₂ CH ₂ SO ₂ CH ₃	3-I	2-CH ₃ -3-F-4-i-C ₃ F ₇	206-210
414	CH(CH ₃)CH ₂ SCH ₃	3-Br	2-C ₂ H ₅ -4-i-C ₃ F ₇	175
415	CH(CH ₃)CH ₂ SCH ₃	3-Br	2-Cl-4-C ₂ F ₅	180
416	CH(CH ₃)CH ₂ SCH ₃	3-Br	3-i-C ₃ H ₇	135
417	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-CH ₃ -4-OSO ₂ CF ₃	187
418	C(CH ₃) ₂ CH ₂ SCH ₃	6-I	2-CH ₃ -4-OSO ₂ CF ₃	Decom- posed
419	C(CH ₃) ₂ CH ₂ SOCH ₃	3-I	2-CH ₃ -4-OSO ₂ CF ₃	Amorphous
420	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-CH ₃ -4-OCF ₂ -CHFOC ₃ F ₇ -n	170-172
421	C(CH ₃) ₂ CH ₂ SOCH ₃	3-I	2-CH ₃ -4-OCF ₂ -CHFOC ₃ F ₇ -n	68-75
422	C(CH ₃) ₂ CH ₂ SO ₂ CH ₃	3-I	2-CH ₃ -4-OCF ₂ -CHFOC ₃ F ₇ -n	170-172

Table 1 (Continued)

No	T ¹	(X) l	(Y) m	Property mp (°C)
423	C(CH ₃) ₂ CH ₂ SC ₃ H ₇ -i	3-Br	2-CH ₃ -4-C ₂ F ₅	162-163
424	C(CH ₃) ₂ CH ₂ SO ₂ C ₃ H ₇ -i	3-I	2-CH ₃ -4-i-C ₃ F ₇	70-75
425	CH(CH ₃)CH ₂ SC(=S)NH -CH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	142
426	CH(CH ₃)CH ₂ SC(=S)NH -C ₂ H ₅	3-I	2-CH ₃ -4-i-C ₃ F ₇	123
427	CH(CH ₃)CH ₂ SCONHC ₂ H ₅	3-I	2-CH ₃ -4-i-C ₃ F ₇	178
428	CH(CH ₃)CH ₂ SCOCH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	117
429	CH(CH ₃)CH ₂ SCH ₂ C≡CH	3-I	2-CH ₃ -4-i-C ₃ F ₇	111
430	CH(CH ₃)CH ₂ SCH ₂ -(2,4-Cl ₂ -Ph)	3-I	2-CH ₃ -4-i-C ₃ F ₇	140
431	C(CH ₃) ₂ CH ₂ S* OCH ₃ (-)isomer	3-I	2-CH ₃ -4-i-C ₃ F ₇	Amorphous [α]=-20.4
432	C(CH ₃) ₂ CH ₂ S* OCH ₃ (+)isomer	3-I	2-CH ₃ -4-i-C ₃ F ₇	Amorphous [α]=20.6
433	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	3-CF ₂ OCF ₂ O-4	205
434	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-Cl-3-CF ₂ OCF ₂ O-4	173
435	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-C ₂ H ₅ -4-i-C ₃ F ₇	188
436	C(CH ₃) ₂ CH ₂ SOCH ₃	3-I	2-C ₂ H ₅ -4-i-C ₃ F ₇	125
437	C(CH ₃) ₂ CH ₂ SO ₂ CH ₃	3-I	2-C ₂ H ₅ -4-i-C ₃ F ₇	166-167
438	C(CH ₃) ₂ CH ₂ S-Ph	3-I	2-CH ₃ -4-i-C ₃ F ₇	167-168
439	C(CH ₃) ₂ CH ₂ SO-Ph	3-I	2-CH ₃ -4-i-C ₃ F ₇	107

Table 1 (Continued)

No	T'	(X) l	(Y) m	Property, mp (°C)
440	$C(CH_3)_2CH_2SO_2-Ph$	3-I	2-CH ₃ -4-i-C ₃ F ₇	200

Table 1 (Continued)

No	T ¹	(X) _l	(Y) _m	Property mp (°C)
441	C(CH ₃) ₂ CH ₂ S-2-Pyi	3-I	2-CH ₃ -4-i-C ₃ F ₇	120-122
442	C(CH ₃) ₂ CH ₂ SO- 2-Pyi	3-I	2-CH ₃ -4-i-C ₃ F ₇	90-95
443	C(CH ₃) ₂ CH ₂ SO ₂ - 2-Pyi	3-I	2-CH ₃ -4-i-C ₃ F ₇	138
444	C(CH ₃) ₂ CH ₂ SO ₂ - 2-Pyi	6-I	2-CH ₃ -4-i-C ₃ F ₇	219
445	Q ¹⁰	3-I	2-CH ₃ -4-i-C ₃ F ₇	212-213
446	Q ¹¹	3-I	2-CH ₃ -4-i-C ₃ F ₇	193-213
447	Q ¹²	3-I	2-CH ₃ -4-i-C ₃ F ₇	203-205
448	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-Cl-4-i-C ₃ F ₇	184
449	C(CH ₃) ₂ CH ₂ SOCH ₃	3-I	2-Cl-4-i-C ₃ F ₇	102-105
450	C(CH ₃) ₂ CH ₂ SO ₂ CH ₃	3-I	2-Cl-4-i-C ₃ F ₇	200-201
451	C(CH ₃) ₂ CH ₂ SCH ₂ - (4-Cl-Ph)	3-I	2-CH ₃ -4-i-C ₃ F ₇	163-164
452	CH(CH ₂ OH)(CH ₂) ₂ S- CH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	102
453	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-CH ₃ -4-(4-Cl-Ph)	172
454	C(CH ₃) ₂ CH ₂ SO ₂ CH ₃	3-I	2-CH ₃ -4-(4-Cl-Ph)	128
455	C(CH ₃) ₂ CH ₂ SCH ₃	3-NO ₂	2-CH ₃ -4-S(2-Cl-Ph)	188
456	C(CH ₃) ₂ CH ₂ SCH ₃	3-NO ₂	2-CH ₃ -4-S(3-Cl-Ph)	181

Table 1 (Continued)

No	T'	(X) _l	(Y) _m	Property mp (°C)
457	C(CH ₃) ₂ CH ₂ SCH ₃	3-NO ₂	2-CH ₃ -4-S(4-Cl-Ph)	201
458	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-CH ₃ -4-S(2-Cl-Ph)	159
459	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-CH ₃ -4-S(3-Cl-Ph)	156
460	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-CH ₃ -4-S(3-Cl-Ph)	156
461	CH(CH ₃)CH ₂ SCON- (CH ₃) ₂	3-I	2-CH ₃ -4-i-C ₃ F ₇	117
462	CH(CH ₃)CH ₂ SCON- (C ₂ H ₅) ₂	3-I	2-CH ₃ -4-i-C ₃ F ₇	75
463	CH(CH ₃)CH ₂ SCH ₂ CO- CH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	86
464	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-CH(CH ₃)CH ₂ CH- (CH ₃) ₂ -4-i-C ₃ F ₇	178
465	C(CH ₃) ₂ CH ₂ SOCH ₃	3-I	2-CH(CH ₃)CH ₂ CH- (CH ₃) ₂ -4-i-C ₃ F ₇	100-105
466	C(CH ₃) ₂ CH ₂ SO ₂ CH ₃	3-I	2-CH(CH ₃)CH ₂ CH- (CH ₃) ₂ -4-i-C ₃ F ₇	157-158
467	(S)-C* H(CH ₃)CH ₂ S -C ₂ H ₅	3-I	2-CH ₃ -4-i-C ₃ F ₇	197
468	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-CH ₃ -4-(CO-(4- CH ₃ -Ph))	138
469	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-CH ₃ -4-(CO-(4- Cl-Ph))	171

Table 1 (Continued)

No	T ¹	(X) _l	(Y) _m	Property mp (°C)
470	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-CH ₃ -4-(C(=NOCH ₃)- (4-Cl-Ph))	Paste
471	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-CH ₃ -4-CH ₂ (4-Cl- Ph)	162
472	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-CH ₃ -4-CH(OH)(4- Cl-Ph)	Paste
473	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-CH ₃ -4-O(4-Cl-Ph)	179
474	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-CH ₃ -4-O(3-Cl-Ph)	170
475	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-CH ₃ -4-O(3-CN-Ph)	176
476	CH(CH ₃)CH ₂ SCH ₃	3-O(3- CF ₃ -Ph)	2-CH ₃ -4-i-C ₃ F ₇	169-170
477	CH(CH ₃)CH ₂ SCH ₃	6-O(3- CF ₃ -Ph)	2-CH ₃ -4-i-C ₃ F ₇	167-169
478	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	4-SO ₂ N(C ₂ H ₅) ₂	207-208
479	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-CH ₃ -4-(CONH(4-Cl- Ph))	236
480	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-CH ₃ -4-(CON(CH ₃)- (4-Cl-Ph))	149
481	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-CH ₃ -4-C(CF ₃) ₂ OCH ₃	195-196
482	C(CH ₃) ₂ CH ₂ SOCH ₃	3-I	2-CH ₃ -4-C(CF ₃) ₂ OCH ₃	178-180
483	C(CH ₃) ₂ CH ₂ SO ₂ CH ₃	3-I	2-CH ₃ -4-C(CF ₃) ₂ OCH ₃	205-206

Table 1 (Continued)

No	T'	(X) _l	(Y) _m	Property mp (°C)
484	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-CH ₃ -4-C(CF ₃) ₂ - OCH ₂ -Ph	149-151
485	C(CH ₃) ₂ CH ₂ SCH ₃	H	4-CF ₃	185-188
486	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-CH ₃ -4-C(CF ₃) ₂ OH	143-145
487	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	4-NHSO ₂ CF ₃	207-209
488	CH(CH ₃)CH ₂ SOCH ₃	H	4-CF ₃	226-227
489	CH(CH ₃)CH ₂ SO ₂ CH ₃	H	4-CF ₃	192-194
490	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-CH ₃ -4-(C(=NOH)- (4-Cl-Ph))	112
491	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-CH ₃ -4-C(CF ₃) ₂ S- CH ₃	163-164
492	C(CH ₃) ₂ CH ₂ SOCH ₃	3-I	2-CH ₃ -4-C(CF ₃) ₂ O- CH ₂ Ph	150-152
493	C(CH ₃) ₂ CH ₂ SO ₂ CH ₃	3-I	2-CH ₃ -4-C(CF ₃) ₂ O- CH ₂ Ph	125-126
494	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-CH ₃ -4-(CON- (C ₂ H ₅) ₂)	187
495	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-CH ₃ -4-(CON- (CH ₃) ₂)	Amorphous
496	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-CH ₃ -4-(CF ₃) ₂ O- C ₂ H ₅	185-186
497	C(CH ₃) ₂ CH ₂ SCH ₃	3, 4-Cl ₂	2-CH ₃ -4-i-C ₃ F ₇	

Table 1 (Continued)

No	T ¹	(X) _l	(Y) _m	Property mp (°C)
498	C(CH ₃) ₂ CH ₂ SOCH ₃	3,4-Cl ₂	2-CH ₃ -4-i-C ₃ F ₇	
499	C(CH ₃) ₂ CH ₂ SO ₂ CH ₃	3,4-Cl ₂	2-CH ₃ -4-i-C ₃ F ₇	
500	CH(CH ₂ OCH ₃)CH ₂ S- CH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	
501	CH(CH ₂ OCH ₃)CH ₂ - SOCH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	
502	CH(CH ₂ OCH ₃)CH ₂ - SO ₂ CH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	
503	CH(CF ₃)CH ₂ SCH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	
504	CH(CH ₂ SCH ₃)CH ₂ - COOCH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	
505	CH(CH ₂ SCH ₃)CH ₂ - CONHCH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	
506	CH(CH ₂ SCH ₃)CH ₂ - CON(CH ₃) ₂	3-I	2-CH ₃ -4-i-C ₃ F ₇	
507	C(CH ₃) ₂ CH ₂ S- C ₃ H ₅ -c	3-I	2-CH ₃ -4-i-C ₃ F ₇	
508	C(CH ₃) ₂ CH ₂ SO- C ₃ H ₅ -c	3-I	2-CH ₃ -4-i-C ₃ F ₇	
509	C(CH ₃) ₂ CH ₂ SO ₂ - C ₃ H ₅ -c	3-I	2-CH ₃ -4-i-C ₃ F ₇	
510	Q ¹³	3-I	2-CH ₃ -4-i-C ₃ F ₇	

Table 1 (Continued)

No	T ¹	(X) _l	(Y) _m	Property mp (°C)
511	Q ¹⁶	3-I	2-CH ₃ -4-i-C ₃ F ₇	
512	Q ¹⁴	3-I	2-CH ₃ -4-i-C ₃ F ₇	
513	Q ¹⁵	3-I	2-CH ₃ -4-i-C ₃ F ₇	
514	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-CH ₃ -4-(4-CF ₃ -Ph)	
515	C(CH ₃) ₂ CH ₂ SOCH ₃	3-I	2-CH ₃ -4-(4-CF ₃ -Ph)	
516	C(CH ₃) ₂ CH ₂ SO ₂ CH ₃	3-I	2-CH ₃ -4-(4-CF ₃ -Ph)	
517	C(CH ₃) ₂ CH ₂ SCH ₃	3-I	2-CH ₃ -4-OCF ₂ CF ₃	
518	C(CH ₃) ₂ CH ₂ SOCH ₃	3-I	2-CH ₃ -4-OCF ₂ CF ₃	
519	C(CH ₃) ₂ CH ₂ SO ₂ CH ₃	3-I	2-CH ₃ -4-OCF ₂ CF ₃	
520	C(CH ₃) ₂ CH ₂ S(=O)- OCH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	
521	C(CH ₃) ₂ CH ₂ SO ₃ CH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	
522	C(CH ₃) ₂ CH ₂ SO ₂ - NHCH ₃	3-I	2-CH ₃ -4-i-C ₃ F ₇	
523	C(CH ₃) ₂ CH ₂ SO ₂ - NHC ₂ H ₅	3-I	2-CH ₃ -4-i-C ₃ F ₇	
524	C(CH ₃) ₂ CH ₂ SO ₂ - N(CH ₃) ₂	3-I	2-CH ₃ -4-i-C ₃ F ₇	
523	C(CH ₃) ₂ CH ₂ SO ₂ - N(C ₂ H ₅) ₂	3-I	2-CH ₃ -4-i-C ₃ F ₇	

Table 2

(R³=H)

No	T ¹	R2	(X) _l	(Y) _m	Property mp (°C)
2-1	(CH ₂) ₂ SC ₂ H ₅	n-C ₃ H ₇	H	2-CH ₃ -4-i-C ₃ F ₇	Paste

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(R ³ =H)					
No	T ¹	R ²	(X)l	(Y)m	Property mp (°C)
2-2	(CH ₂) ₂ SCH ₃	n-C ₃ H ₇	H	2-CH ₃ -4-i-C ₃ F ₇	122
2-3	(CH ₂) ₂ SCH ₃	n-C ₃ H ₇	3-F	2-CH ₃ -4-i-C ₃ F ₇	124
2-4	(CH ₂) ₂ SO ₂ CH ₃	n-C ₃ H ₇	3-F	2-CH ₃ -4-i-C ₃ F ₇	81
2-5	(CH ₂) ₂ SCH ₃	C ₂ H ₅	3-F	2-CH ₃ -4-i-C ₃ F ₇	132-137
2-6	(CH ₂) ₃ SCH ₃	C ₂ H ₅	3-F	2-CH ₃ -4-i-C ₃ F ₇	120-122
2-7	(CH ₂) ₂ SCH ₃	CH ₃	3-F	2-CH ₃ -4-i-C ₃ F ₇	127-132
2-8	CH ₂ SCH ₃	C ₂ H ₅	3-Cl	2-CH ₃ -4-i-C ₃ F ₇	155-159
2-9	(CH ₂) ₂ SOCH ₃	CH ₃	3-F	2-CH ₃ -4-i-C ₃ F ₇	Paste
2-10	(CH ₂) ₂ SO ₂ CH ₃	CH ₃	3-F	2-CH ₃ -4-i-C ₃ F ₇	160-164
2-11	(CH ₂) ₂ SOCH ₃	C ₂ H ₅	3-F	2-CH ₃ -4-i-C ₃ F ₇	Paste
2-12	(CH ₂) ₂ SO ₂ CH ₃	C ₂ H ₅	3-F	2-CH ₃ -4-i-C ₃ F ₇	Paste
2-13	(CH ₂) ₃ SOCH ₃	C ₂ H ₅	3-F	2-CH ₃ -4-i-C ₃ F ₇	Paste
2-14	(CH ₂) ₃ SO ₂ CH ₃	C ₂ H ₅	3-F	2-CH ₃ -4-i-C ₃ F ₇	173
2-15	CH(CH ₃)CH ₂ SCH ₃	C ₂ H ₅	3-F	2-CH ₃ -4-i-C ₃ F ₇	114
2-16	CH ₂ SCH ₃	C ₂ H ₅	3-Cl	2-CH ₃ -4-OCF ₃	Refr.Index nD1.5440 (21.0°C)
2-17	CH ₂ SCH ₃	C ₂ H ₅	3-Cl	2-CH ₃ -4-OC ₂ F ₅	Refr.Index nD1.5365 (21.0°C)

General formula (1)

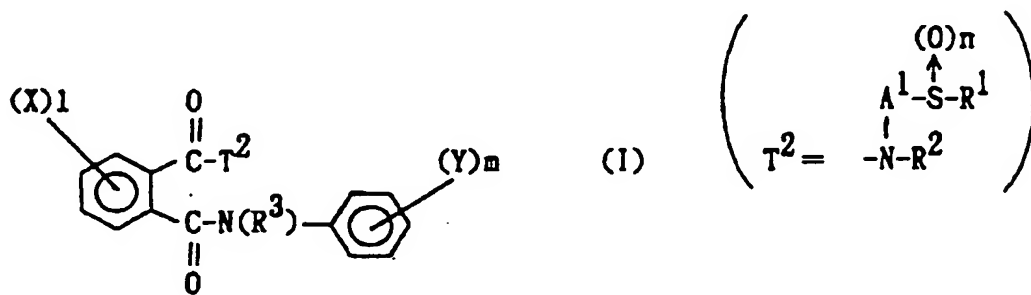


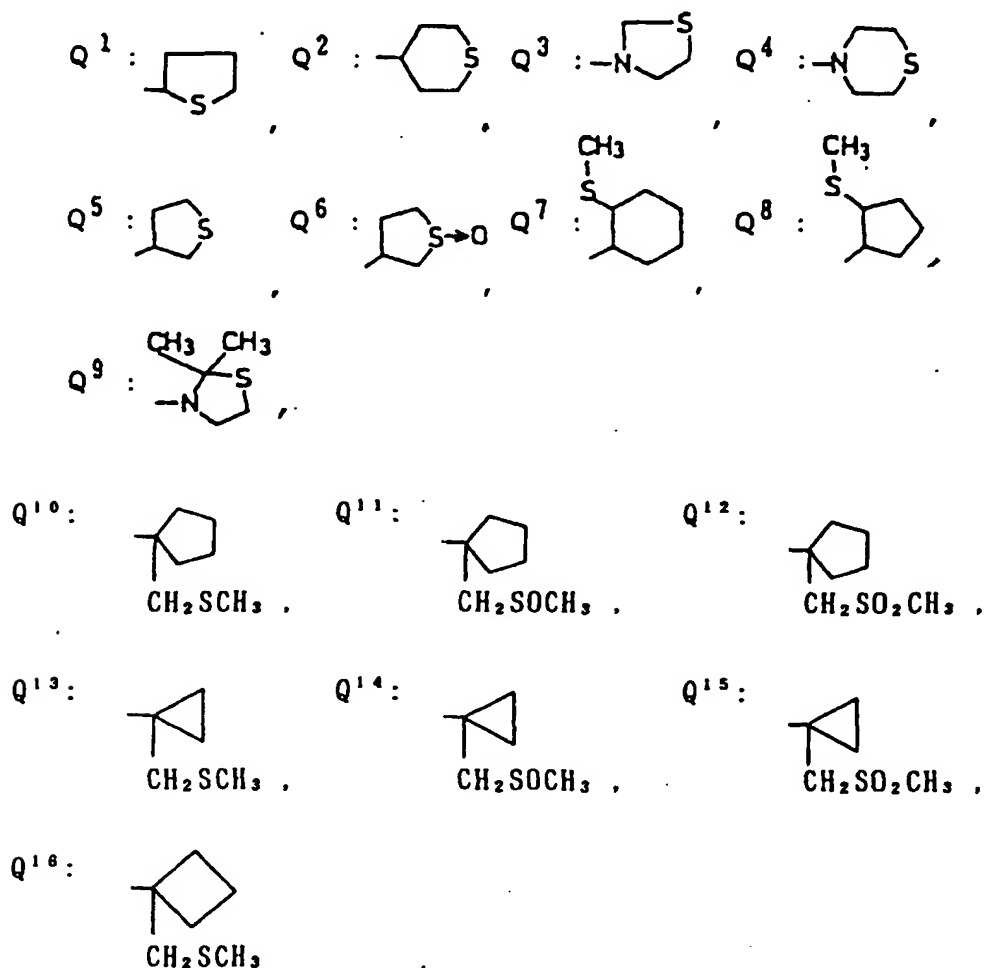
Table 3

(R ² =R ³ =H)				
No	T ²	(X)l	(Y)m	Property mp (°C)
3-1	Q ³	3-I	2-CH ₃ -4-C ₂ F ₅	163
3-2	Q ³	3-I	2-CH ₃ -4-i-C ₃ F ₇	144
3-3	Q ⁴	3-I	2-CH ₃ -4-OCF ₃	173-175
3-4	Q ⁴	3-I	2-CH ₃ -4-C ₂ F ₅	158-160
3-5	Q ⁴	3-I	2-CH ₃ -4-i-C ₃ F ₇	186-188

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(R ² =R ³ =H)				
No	T ²	(X)l	(Y)m	Property mp (°C)
3-6	Q ⁹	3-I	2-CH ₃ -4-i-C ₃ F ₇	195-197

[0046] In Tables 1 to 3, "Ph" means phenyl group; "Pyi" means pyridyl group; "Pym" means pyrimidyl group; "Thz" means thiazolyl group; "Thd" means thiadiazolyl group; "Bzt" means benzothiazolyl group; "c-" means an alicyclic hydrocarbon group; and Q¹, Q², Q³, Q⁴, Q⁵, Q⁶, Q⁷, Q⁸, Q⁹, Q¹⁰, Q¹¹, Q¹², Q¹³, Q¹⁴, Q¹⁵ and Q¹⁶ represent the following compounds:



[0047] In Tables 1, 2 and 3, some compounds show a property of paste. The ¹H-NMR data of such compounds are shown in Table 4.

Table 4

No	¹ H-NMR[CDCl ₃ /TMS, δ value (ppm)]
2	0.8-1.4(m.9H), 2.4(s.3H), 2.5-2.8(m.3H), 4.3(m.1H), 6.2(d.1H), 7.2-7.5(m.3H), 7.8(d.1H), 8.0(d.1H), 8.4(d.1H), 8.5(s.1H).

[0048] The agrohorticultural insecticides containing the phthalamide derivative of the general formula (I) or salt thereof of the present invention as an active ingredient are suitable for controlling various insect pests such as agricultural insect pests, forest insect pests, horticultural insect pests, stored grain insect pests, sanitary insect pests, nematodes, etc., which are injurious to paddy rice, fruit trees, vegetables, other crops, flowers and ornamental plants, etc. They have a marked insecticidal effect, for example, on LEPIDOPTERA including summer fruit tortrix (*Adoxophyes orana fasciata*), smaller tea tortrix (*Adoxophyes* sp.), Manchurian fruit moth (*Grapholita inopinata*), oriental fruit moth (*Grapholita molesta*), soybean pod border (*Leguminivora glycinivorella*), mulberry leafroller (*Olethreutes mori*), tea leafroller (*Caloptilia theivora*), *Caloptilia* sp. (*Calopilia zachrysa*), apple leafminer (*Phyllonorycter ringoniella*), pear barkminer (*Spulerina astaura*), common white (*Piers rapae crucivora*), tobacco budworm (*Heliothis* sp.) codling moth (*Laspeyresia pomonella*), diamondback moth (*Plutella xylostella*), apple fruit moth (*Argyresthia conjugella*), peach fruit moth (*Carpocapsa niponensis*), rice stem borer (*Chilo suppressalis*), rice leafroller (*Cnaphalocrocis medinalis*), tobacco moth (*Ephestia elutella*), mulberry pyralid (*Glyphodes pyralis*), yellow rice borer (*Scirpophaga incertulas*), rice skipper (*Parnara guttata*), rice armyworm (*Pseudaletia separata*), pink borer (*Sesamia inferens*), common cutworm (*Spodoptera litura*), beet armyworm (*Spodoptera exigua*), etc.; HEMIPTERA including aster leafhopper (*Macrostelus fascifrons*), green rice leafhopper (*Nephotettix cincticeps*), brown rice planthopper (*Nilaparvata lugens*), whitebacked rice planthopper (*Sogatella furcifera*), citrus psylla (*Diaphorina citri*), grape whitefly (*Aleurolobus taenabae*), sweetpotato whitefly (*Bemisia tabaci*), greenhouse whitefly (*Trialeurodes vaporariorum*), turnip aphid (*Lipaphis erysimi*), green peach aphid (*Myzus persicae*), Indian wax scale (*Ceroplastes ceriferus*), cottony citrus scale (*Pulvinaria aurantii*), camphor scale (*Pseudaulnobia duplex*), san Jose scale (*Comstockaspis perniciosus*), arrowhead scale (*Anaspis yanonensis*), etc.; TYLENCHIDA including root-lesion nematode (*Pratylenchus* sp.), soybean beetle (*Anomala fufucuprea*), Japanese beetle (*Popillia japonica*), tobacco beetle (*Lasioderma serricornis*), powderpost beetle (*Lyctus brunneus*), twenty-eight-spotted ladybird (*Epilachna vigintioctopunctata*), azuki bean weevil (*Callosobruchus chinensis*), vegetable weevil (*Listroderes costirostris*), maize weevil (*Sitophilus zeamais*), boll weevil (*Aethionomus grandis grandis*), rice water weevil (*Lissorhoptrus oryophilus*), cucurbit leaf beetle (*Aulacophora femoralis*), rice leaf beetle (*Oulema oryzae*), striped flea beetle (*Phyllotreta striolata*), pine shoot beetle (*Tomicus piniperda*), Colorado potato beetle (*Leptinotarsa decemlineata*), Mexican bean beetle (*Epilachna varivestis*), corn rootworm (*Diabrotica* sp.), etc.; DIPTERA including melon fly (*Dacus*(*Zeugodacus*) *cucurbitae*), oriental fruit fly (*Dacus*(*Bactrocera*) *dorsalis*), rice leafminer (*Agonomyza oryzae*), onion maggot (*Delia antiqua*), seedcorn maggot (*Delia platura*), soybean pod gall midge (*Asphondylia* sp.), muscid fly (*Musca domestica*), house mosquito (*Culex pipiens pipiens*), etc.; and TYLENCHIDA including coffer root-lesion nematode (*Pratylenchus coffeae*), potato cyst nematode (*Globodera rostochiensis*), root-knot nematode (*Meloidogyne* sp.), citrus nematode (*Tylenchulus semipenetrans*), *Aphelenchus* sp. (*Aphelenchus avenae*), chrysanthemum foliar (*Aphelenchoides ritzemabosi*), etc.

[0049] The agricultural and horticultural insecticide containing the phthalamide derivative of the general formula (I) or salt thereof of the present invention as an active ingredient has a marked insecticidal effect on the above-exemplified insect pests, sanitary insect pests, and/or nematodes, which are injurious to paddy field crops, upland crops, fruit trees, vegetables, other crops, flowers and ornament plants, and the like. Therefore, the desired effect of the agricultural and horticultural insecticide of the present invention can be obtained by applying the insecticide to paddy field; upland field; crops such as fruits, vegetables, ornament plants and the like; seeds, flowers, stalks, leaves, etc. of plants itself; environments of plant growth such as paddy field water, soil, etc. at a season at which the insect pests, sanitary pests or nematodes are expected to appear, before their appearance or at the time when their appearance is confirmed.

[0050] In general, the agricultural and horticultural insecticide of the present invention is used after being prepared into conveniently usable forms according to an ordinary manner for preparation of agrochemicals.

[0051] That is, the phthalamide derivative of the general formula (I) or salt thereof and, optionally, an adjuvant are blended with a suitable inert carrier in a proper proportion and prepared into a suitable preparation form such as a suspension, emulsifiable concentrate, soluble concentrate, wettable powder, granules, dust or tablets through dissolution, dispersion, suspension, mixing, impregnation, adsorption or sticking.

[0052] The inert carrier used in this invention may be either solid or liquid. As the solid carrier, there can be exemplified soybean flour, cereal flour, wood flour, bark flour, saw dust, powdered tobacco stalks, powdered walnut shells, bran, powdered cellulose, extraction residues of vegetables, powdered synthetic polymers or resins, clays (e.g. kaolin, bentonite, and acid clay), talcs (e.g. talc and pyrophyllite), silica powders or flakes (e.g. diatomaceous earth, silica sand, mica and white carbon, i.e. synthetic, high-dispersion silicic acid, also called finely divided hydrated silica or hydrated silicic acid, some of commercially available products contain calcium silicate as the major component), activated carbon, powdered sulfur, powdered pumice, calcined diatomaceous earth, ground brick, fly ash, sand, calcium carbonate powder, calcium phosphate powder and other inorganic or mineral powders, chemical fertilizers (e.g. ammonium sulfate, ammonium phosphate, ammonium nitrate, urea and ammonium chloride), and compost. These carriers may be used alone or as a mixture thereof.

[0053] The liquid carrier is that which itself has solubility or which is without such solubility but is capable of dispersing an active ingredient with the aid of an adjuvant. The following are typical examples of the liquid carrier and can be used alone or as a mixture thereof. Water; alcohols such as methanol, ethanol, isopropanol, butanol and ethylene glycol; ketones such as acetone, methyl ethyl ketone, methyl isobutyl ketone, diisobutyl ketone and cyclohexanone; ethers such as ethyl ether, dioxane, Cellosolve, dipropyl ether and tetrahydrofuran; aliphatic hydrocarbons such as kerosene and mineral oils; aromatic hydrocarbons such as benzene, toluene, xylene, solvent

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naphtha and alkylnaphthalenes; halogenated hydrocarbons such as dichloroethane, chloroform, carbon tetrachloride and chlorobenzene; esters such as ethyl acetate, diisopropyl phthalate, dibutyl phthalate and dioctyl phthalate; amides such as dimethylformamide, diethylformamide and dimethylacetamide; nitriles such as acetonitrile; and dimethyl sulfoxide.

[0054] The following are typical examples of the adjuvant, which are used depending upon purposes and used alone or in combination in some cases, or need not to be used at all.

[0055] To emulsify, disperse, dissolve and/or wet an active ingredient, a surfactant is used. As the surfactant, there can be exemplified polyoxyethylene alkyl ethers, polyoxyethylene alkylaryl ethers, polyoxyethylene higher fatty acid esters, polyoxyethylene resinsates, polyoxyethylene sorbitan mono-laurate, polyoxyethylene sorbitan monooleate, alkylarylsulfonates, naphthalenesulfonic acid condensation products, ligninsulfonates and higher alcohol sulfate esters.

[0056] Further, to stabilize the dispersion of an active ingredient, tackify it and/or bind it, there may be used adjuvants such as casein, gelatin, starch, methyl cellulose, carboxymethyl cellulose, gum arabic, polyvinyl alcohols, turpentine, bran oil, bentonite and ligninsulfonates.

[0057] To improve the flowability of a solid product, there may be used adjuvants such as waxes, stearates and alkyl phosphates.

[0058] Adjuvants such as naphthalenesulfonic acid condensation products and polycondensates of phosphates may be used as a peptizer for dispersible products.

[0059] Adjuvants such as silicon oils may also be used as a defoaming agent.

[0060] The content of the active ingredient may be varied as required and may be chosen in a range of 0.01 to 80% by weight as an active ingredient. In dusts or granules, the suitable content thereof is from 0.01 to 50% by weight. In emulsifiable concentrates or flowable wettable powders, it is also from 0.01 to 50% by weight.

[0061] The agricultural and horticultural insecticide of the present invention is used to control a variety of insect pests in the following manner. That is, it is applied to a crop on which the insect pests are expected to appear or a site where the appearance of the insect pests is undesirable, as it is or after being properly diluted with or suspended in water or the like, in an amount effective for control of the insect pests.

[0062] The applying dosage of the agricultural and horticultural insecticide of the present invention is varied depending upon various factors such as a purpose, insect pests to be controlled, a growth state of a plant, tendency of insect pests appearance, weather, environmental conditions, a preparation form, an application method, an application site and an application time. It may be properly chosen in a range of 0.1 g to 10 kg (in terms of the active ingredient) per 10 ares depending upon purposes.

[0063] The agricultural and horticultural insecticide of the present invention may be used in admixture with other agricultural and horticultural disease or pest controllers, acaricides, nematocides, bioagrochemicals, etc.; and herbicides, plant growth regulators, manures, etc. depending upon scenes using the present agricultural and horticultural insecticides, in order to expand both spectrum of controllable diseases and insect pest species and the period of time when effective applications are possible or to reduce the dosage.

[0064] The agrohorticultural insecticide of the present invention may be applied to the plant seeds or the cultivation mediums for seeding such as soil to be seeded, the mat for raising seedlings, water, etc. by the method of application to rice nursery box, seed powdering, etc. or by the method of seed disinfection. For controlling the pest insects generated on fruit trees, cereals, upland field for vegetables, etc., it is also possible to make a plant absorb the agrohorticultural agent of the present invention by a seed treatment such as powder coating, dipping, etc., irrigation into seedling-raising carrier such as seedling-raising vessel, planting hole, etc. or by treatment of the culture solution for water culture.

EXAMPLES

[0065] Next, typical examples of the present invention are presented below. The present invention is by no means limited by these examples.

Example 1

(1-1) Production of N-[4-(1,1,2,3,3,3-hexafluoropropoxy)-1-methylphenyl]-3-nitrophthalimide

[0066] In 30 ml of acetic acid were dissolved 1.93 g of 3-nitrophthalic anhydride and 2.73 g of 4-(1,1,2,3,3,3-hexafluoropropoxy)-1-methylaniline. A reaction was carried out for 3 hours with heating under reflux. After completion of the reaction, the solvent was distilled off under reduced pressure, and the residue was washed with a mixture of ether and hexane, whereby 4.4 g of the objective compound was obtained.

Property: m.p. 121°C; Yield: 98%

(1-2) Production of N¹-[4-(1,1,2,3,3,3-hexafluoropropoxy)-1-methylphenyl]-N²-(1-methyl-2-methylthioethyl)-3-nitrophthalamide (Compound No. 223)

[0067] In 10 ml of dioxane was dissolved 0.54 g of N-[4-(1,1,2,3,3,3-hexafluoropropoxy)-1-methylphenyl]-3-

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nitrophthalimide. Then, 0.25 g of 1-methyl-2-methylthioethylamine and 0.01 g of acetic acid were added to the solution obtained above, and a reaction was carried out for 3 hours with heating under reflux. After completion of the reaction, the solvent was distilled off under reduced pressure, and the residue was purified by column chromatography using 1/1 mixture of hexane and ethyl acetate as an eluent. Thus, 0.45 g of the objective compound having an R_f value of 0.4 to 0.5 was obtained.

Property: m.p. 218°C; Yield: 68%

Example 2

(2-1) Production of 3-fluoro-N-(4-heptafluoroisopropyl-2-methylphenyl)phthalimide

[0068] In 10 ml of acetic acid were dissolved 1.33 g of 3-fluorophthalic anhydride and 4-heptafluoroisopropyl-2-methylaniline. A reaction was carried out for 3 hours with heating under reflux. After completion of the reaction, the solvent was distilled off under reduced pressure, and the residue was washed with a mixture of ether and hexane to obtain 3.1 g of the objective compound.

Property: m.p. 155-157°C; Yield: 97%

(2-2) Production of N-(heptafluoroisopropyl-2-methylphenyl)phthalimide

[0069] In 20 ml of dimethylformamide was dissolved 2.54 g of 3-fluoro-N-(4-heptafluoroisopropyl-2-methylphenyl)-phthalimide. After adding 2.8 g of a 15% aqueous solution of methylmercaptan to the solution obtained above, a reaction was carried out at room temperature for 3 hours with stirring. After completion of the reaction, the reaction solution was poured into water, and the objective product was extracted with ethyl acetate. The extract solution was dried on anhydrous magnesium, the solvent was distilled off under reduced pressure, and the residue was washed with a mixture of ether and hexane. Thus, 2.2 g of the objective compound was obtained.

Property: m.p. 163-165°C; Yield: 81%

(2-3) Production of N-(4-heptafluoroisopropyl-2-methylphenyl)-3-methylsulfonylphthalimide

[0070] In 20 ml of dichloromethane was dissolved 0.63 g of N-(4-heptafluoroisopropyl-2-methylphenyl)-3-methylthiophthalimide. While cooling the solution with ice, 0.58 g of m-chloroperbenzoic acid was added and reacted at room temperature. After completion of the reaction, the reaction solution was poured into water, and the objective product was extracted with chloroform. The organic layer was washed with an aqueous solution of sodium thiosulfate and an aqueous solution of potassium carbonate and dried on anhydrous magnesium, the solvent was distilled off under reduced pressure, and the residue was washed with a mixture of ether and hexane. Thus, 0.63 g of the objective compound was obtained.

Property: m.p. 185-187°C; Yield: 93%

(2-4) Production of N¹-(4-heptafluoroisopropyl-2-methylphenyl)-N²-(1-methyl-2-methylthioethyl)-3-methylsulfonylphthalamide (Compound No. 191) and N¹-(4-heptafluoroisopropyl-2-methylphenyl)-N²-(1-methyl-2-methylthioethyl)-6-methylsulfonylphthalamide (Compound No. 192)

[0071] In 10 ml of dioxane was dissolved 0.63 g of N-(4-heptafluoroisopropyl-2-methylphenyl)-3-methylsulfonylphthalimide. After adding 0.25 g of 1-methyl-2-methylthioethylamine and 0.01 g of acetic acid to the solution obtained above, a reaction was carried out for 3 hours with heating under reflux. After completion of the reaction, the solvent was distilled off under reduced pressure, and the residue was purified by silica gel column chromatography using 1/1 mixture of hexane and ethyl acetate as an eluent. Thus, 0.42 g of the first objective compound having an R_f value of 0.5 to 0.7 (Compound No. 191) and 0.18 g of the second objective compound having an R_f value of 0.2 to 0.3 (Compound No. 192) were obtained.

Compound No. 191: Property: m.p. 205-206°C;
Yield: 55%

Compound No. 192: Property: m.p. 210-212°C;
Yield: 24%

Example 3

(3-1) Production of 3-iodo-N-(1-methyl-3-methylthiopropyl)-phthalamic acid

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[0072] To a suspension of 2.74 g of 3-iodophthalic anhydride in 8 ml of acetonitrile cooled with ice was slowly added dropwise a solution of 1.19 g of 1-methyl-3-methylthiopropylamine in 3 ml of acetonitrile. After completion of the dropping, a reaction was carried out at room temperature for 3 hours with stirring. After completion of the reaction, the deposited crystal was collected by filtration and washed with a small quantity of acetonitrile. Thus, 3.5 g of the objective compound was obtained.

Property: m.p. 148-150°C; Yield: 89%

(3-2) Production of 6-iodo-N-(1-methyl-3-methylthiopropyl)-phthalisoimide

[0073] To a suspension of 0.79 g of 3-iodo-N-(1-methyl-3-methylthiopropyl)phthalamic acid in 10 ml of toluene was added 0.63 g of trifluoroacetic anhydride. A reaction was carried out at room temperature for 30 minutes with stirring. After completion of the reaction, the solvent was distilled off under reduced pressure to obtain 0.75 g of a crude objective product, which was used in the subsequent reaction without purification.

(3-3) Production of 6-iodo-N¹-(4-heptafluoroisopropyl-2-methylphenyl)-N²-(1-methyl-3-methylthiopropyl)phthalamide (Compound No. 162)

[0074] In 10 ml of acetonitrile was dissolved 0.75 g of 6-iodo-N-(1-methyl-3-methylthiopropyl)phthalisoimide. After adding 0.55 g of 4-heptafluoroisopropyl-2-methylaniline and 0.01 g of trifluoroacetic acid to the solution obtained above, a reaction was carried out for 3 hours with stirring. After completion of the reaction, the deposited crystal was collected by filtration and washed with a small quantity of cold acetonitrile. Thus, 1.17 g of the objective compound was obtained.

Property: m.p. 192-194°C; Yield: 90%

(3-4) Production of 3-iodo-N¹-(4-heptafluoroisopropyl-2-methylphenyl)-N²-(1-methyl-3-methylsulfonylpropyl)-phthalamide (Compound No. 195)

[0075] In 10 ml of dichloromethane was dissolved 0.65 g of 6-iodo-N¹-(4-heptafluoroisopropyl-2-methylphenyl)-N²-(1-methyl-3-methylthiopropyl)phthalamide. After adding 0.18 g of m-chloroperbenzoic acid to the solution obtained above, a reaction was carried out at room temperature for 3 hours. After completion of the reaction, the reaction solution was poured into water, and the objective product was extracted with chloroform. The organic layer was washed with an aqueous solution of sodium thiosulfate and an aqueous solution of potassium carbonate and dried on anhydrous magnesium sulfate, the solvent was distilled off under reduced pressure, and the residue was washed with a mixture of ether and hexane. Thus, 0.61 g of the objective compound was obtained.

Property: m.p. 123-125°C; Yield: 92%

(3-5) Production of 3-iodo-N¹-(4-heptafluoroisopropyl-2-methylphenyl)-N²-(1-methyl-3-methylsulfonylpropyl)-phthalamide (Compound No. 196)

[0076] 3-iodo-N¹-(4-heptafluoroisopropyl-2-methylphenyl)-N²-(1-methyl-3-methylsulfonylpropyl)phthalamide (0.4 g) was treated in the same manner as in Example (3-4). Thus, 0.39 g of the objective compound was obtained.

Property: m.p. 128-130°C; Yield: 95%

Example 4

(4-1) Production of N-(4-heptafluoroisopropyl-2-methylphenyl)-3-trifluoromethoxybenzamide

[0077] In 50 ml of tetrahydrofuran was dissolved 2.24 g of 3-trifluoromethoxybenzoyl chloride, to which were slowly added dropwise 2.75 g of 4-heptafluoroisopropyl-2-methylaniline and 1.2 g of triethylamine. After completion of the dropping, a reaction was carried out at room temperature for 1 hour. After completion of the reaction, the reaction solution was poured into water, the objective product was extracted with ethyl acetate and dried on anhydrous magnesium sulfate, the solvent was distilled off under reduced pressure, and the residue was washed with a mixture of ether and hexane. Thus, 4.6 g of the objective compound was obtained.

Property: Oily product; Yield: 99%

(4-2) Production of N-(4-heptafluoroisopropyl-2-methylphenyl)-3-trifluoromethoxyphthalamic acid

[0078] In 20 ml of tetrahydrofuran was dissolved 2.2 g of N-(4-heptafluoroisopropyl-2-methylphenyl)-3-trifluoromethoxybenzamide. At -70°C, 10 ml of s-butyllithium (0.96 M/L) was slowly added to the above solution and reacted at that temperature for 30 minutes. Then, the cooling bath was removed, and an excessive amount of carbon dioxide was introduced into the reaction solution and reacted at room temperature for 30 minutes. After completion of the reaction, the reaction solution was poured into water and acidified with dilute hydrochloric acid, the objective product was extracted with ethyl acetate and dried on anhydrous magnesium sulfate, the solvent was distilled off under reduced pressure, and the residue was washed with a mixture of ether and hexane. Thus, 2.1 g of the objective compound was obtained.

Property: m.p. 168-172°C; Yield: 87%

(4-3) Production of N-(4-heptafluoroisopropyl-2-methylphenyl)-3-trifluoromethoxyphthalisoimide

[0079] To a suspension of 0.46 g of N-(4-heptafluoroisopropyl-2-methylphenyl)-3-trifluoromethoxyphthalamic acid in 10 ml of toluene was added 0.51 g of trifluoroacetic anhydride, and a reaction was carried out at room temperature for 30 minutes. After completion of the reaction, the solvent was distilled off under reduced pressure to obtain 0.49 g of a crude objective product. The product thus obtained was used in the subsequent reaction without purification.

(4-4) Production of N¹-(4-heptafluoroisopropyl-2-methylphenyl)-N²-3-(1-methyl-2-methylthioethyl)-3-trifluoromethoxyphthalamide (Compound No. 210)

[0080] In 10 ml of acetonitrile was dissolved 0.44 g of N-(4-heptafluoroisopropyl-2-methylphenyl)-3-trifluoromethoxyphthalisoimide. Then, 0.10 g of 1-methyl-2-methylthioethylaniline and 0.01 g of trifluoroacetic acid were added to the solution obtained above, and reacted for 3 hours. After completion of the reaction, the reaction solution was cooled to 0°C, the deposited crystal was collected by filtration, and washed with hexane. Thus, 0.46 g of the objective compound was obtained.

Property: m.p. 184-185°C; Yield: 77%

[0081] Next, typical formulation examples of the present invention and test examples are presented below. The present invention is by no means limited by these examples.

[0082] In the formulation examples, the term "parts" means "parts by weight".

Formulation Example 1

[0083]

Each compound listed in Table 1, 2 or 3	50 parts
Xylene	40 parts
Mixture of polyoxyethylene nonylphenyl ether and calcium alkylbenzenesulfonate	10 parts

[0084] An emulsifiable concentrate was prepared by mixing uniformly the above ingredients to effect dissolution.

Formulation Example 2

[0085]

Each compound listed in Table 1, 2 or 3	3 parts
Clay powder	82 parts
Diatomaceous earth powder	15 parts

[0086] A dust was prepared by mixing uniformly and grinding the above ingredients.

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Formulation Example 3

[0087]

Each compound listed Table 1, 2 or 3	5 parts
Mixed powder of bentonite and clay	90 parts
Calcium lignin sulfonate	5 parts

[0088] Granules were prepared by mixing the above ingredients uniformly, and kneading the resulting mixture together with a suitable amount of water, followed by granulation and drying.

Formulation Example 4

[0089]

Each compound listed in Table 1, 2 or 3	20 parts
Mixture of kaolin and synthetic high-dispersion silicic acid	75 parts
Mixture of polyoxyethylene nonylphenyl ether and calcium alkylbenzenesulfonate	5 parts

[0090] A wettable powder was prepared by mixing uniformly and grinding the above ingredients.

Test Example 1: Insecticidal effect on diamond back moth (*Plutella xylostella*)

[0091] Adult diamondback moths were released and allowed to oviposit on a Chinese cabbage seedling. Two days after the release, the seedling having the eggs deposited thereon was immersed for about 30 seconds in a liquid chemical prepared by diluting a preparation containing each compound listed in Table 1, 2 or 3 as an active ingredient to adjust the concentration to 50 ppm. After air-dryness, it was allowed to stand in a room thermostatted at 25°C. Six days after the immersion, the hatched insects were counted. The mortality was calculated according to the following equation and the insecticidal effect was judged according to the criterion shown below. The test was carried out with triplicate groups of 10 insects.

Corrected mortality(%) =

$$\frac{[\text{Number of hatched insects in untreated group}] - [\text{Number of hatched insects in treated group}]}{[\text{Number of hatched insects in untreated group}]} \times 100$$

Criterion:

[0092]

Effect	Mortality(%)
A	100
B	99 - 90
C	89 - 80
D	79 - 50

[0093] The results obtained are shown in Table 5.

Test Example 2: Insecticidal effect on common cutworm (*Spodoptera litura*)

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[0094] A piece of cabbage leaf (cultivar; Shikidori) was immersed for about 30 seconds in a liquid chemical prepared by diluting a preparation containing each compound listed in Table 1, 2 or 3 as an active ingredient to adjust the concentration to 50 ppm. After air-dryness, it was placed in a plastic Petri dish with a diameter of 9 cm and inoculated with second-instar larvae of common cutworm, after which the dish was closed and then allowed to stand in a room thermostatted at 25°C. Eight days after the inoculation, the dead and alive were counted. The mortality was calculated according to the following equation and the insecticidal effect was judged according to the criterion shown in Test Example 1. The test was carried out with triplicate groups of 10 insects.

Corrected mortality(%) =

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$$\frac{[\text{Number of alive larvae in untreated group}] - [\text{Number of alive larvae in treated group}]}{[\text{Number of alive larvae in untreated group}]} \times 100$$

[0095] The results are shown in Table 5.

Test Example 3: Insecticidal effect on smaller tea tortrix (*Adoxophyes* sp.)

[0096] A leaf of tea tree was immersed for 30 seconds in a liquid chemical containing each compound listed in Table 1, 2 or 3 as an active ingredient to adjust the concentration to 50 ppm. After air-dryness, the leaf was transferred to a plastic dish with a diameter of 9 cm and inoculated with larval smaller tea tortrix. Then, the leaf was allowed to stand in a room thermostatted at 25°C at a humidity of 70%. Eight days after the inoculation, the dead and alive were counted, and the insecticidal effect was judged according to the same criterion as mentioned in Test Example 1. The test was carried out with triplicate groups of 10 insects.

[0097] The results are shown in Table 5.

Table 5

No	Test Example 1	Test Example 2	Test Example 3
1	A	A	A
2	A	A	A
3	A	A	A
4	A		
5	A	A	
6	A	A	A
7	A	A	A
8	A		C
9	A		
10	A	A	A
11	A	A	A
12	A		
13	A		
14	A		
15	A		
16	A		A
17	A	A	A
18	A	A	A
19	A	A	A
20	A	A	A
21	A	A	A
22	A	A	A
23	A	A	A

Table 5 (Continued)

5

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No	Test Example 1	Test Example 2	Test Example 3
2 4	A		A
2 5	A	A	A
2 6	A	A	A
2 7	A		
2 8	A	A	A
2 9	A	A	A
3 0	A	A	A
3 1	A	A	A
3 2	A	A	A
3 3	A	A	A
3 4	A	A	A
3 5	A	A	A
3 6	A		
3 7	A	A	A
3 8	A		A
3 9	A	A	A
4 1	A	A	A
4 2	A		
4 3	A		A
4 4	A		A
4 6	A		A
4 7	A		
4 8	A	A	A

Table 5 (Continued)

No	Test Example 1	Test Example 2	Test Example 3
4 9	A	A	A
5 0	A	A	A
5 1	A		
5 2	A		
5 3	A		A
5 4	A	C	A
5 5	A		
5 6	A	A	A
5 7	A		A
5 8	A		
5 9	A		A
6 0	A		A
6 1	A	A	A
6 2	A	A	A
6 3	A		A
6 4	A		A
6 5	A	A	A
6 6	A	A	A
6 7	A	A	A
7 1	A		
7 2	A		A
7 3	A	C	A
7 4	A	D	

Table 5 (Continued)

No	Test Example 1	Test Example 2	Test Example 3
7 5	A	A	A
7 6	A	A	A
7 7	A		
7 8	A		
7 9	A	A	A
8 0	A	A	A
8 1	A	A	A
8 2	A		A
8 3	A	A	A
8 4	A	A	A
8 5	A		A
8 6	A	A	A
8 7	A	C	
8 8	A	C	
8 9	A		A
9 0	A		A
9 2	A	A	A
9 3	A	A	A
9 4	A	A	A
9 5	A	A	A
9 6	A	A	A
9 7	A	A	A
9 8	A	A	A

Table 5 (Continued)

No	Test Example 1	Test Example 2	Test Example 3
99	A	A	A
100	A	C	A
101	A	A	A
102	A	A	
103	A		
104	A		
105	A		A
106	A	A	A
107	A		
108	A	A	
109	A	A	A
110	A		
111	A		B
112	A	A	A
113	A	A	A
114	A	A	A
115	A	A	
116	A		
117	A		A
118	A	A	A
119	A	A	A
120	A		
121	A	A	A

Tabl 5 (Continued)

No	Test Example 1	Test Example 2	Test Example 3
1 2 2	A	A	A
1 2 3	A	A	A
1 2 4	A	A	A
1 2 5	A	A	A
1 2 6	A	A	A
1 2 7	A	A	A
1 2 9	A		
1 3 0	A	A	A
1 3 2	A		
1 3 3	A	A	
1 3 4	A	A	A
1 3 5	A	A	A
1 3 6	A	A	A
1 3 7	A		A
1 3 9	A	A	
1 4 0	A	A	A
1 4 1	A	A	
1 4 2	A	A	A
1 4 3	A	D	
1 4 4	A	A	
1 4 5	A	A	A
1 4 6	A	A	A
1 4 7	A		

Table 5 (Continu d)

No	Test Example 1	Test Example 2	Test Example 3
1 4 8	A	C	
1 4 9	A	A	
1 5 0	A	A	A
1 5 1	A		
1 5 2	A		
1 5 3	A	A	A
1 5 4	A	A	A
1 5 5	A		A
1 5 6	A	A	A
1 5 7	A	A	A
1 5 8	A		
1 5 9	A	A	A
1 6 0	A	A	A
1 6 1	A	A	A
1 6 2	A	A	A
1 6 3	A	A	A
1 6 4	A		A
1 6 5	A	A	A
1 6 6	A	A	A
1 6 7	A	A	A
1 6 8	A	A	A
1 6 9	A	A	A
1 7 0	A	A	A

Table 5 (Continued)

No	Test Example 1	Test Example 2	Test Example 3
171	A		A
172	A		
173	A	A	A
174	A	C	A
175	A	D	A
176	A	A	A
177	A		
178	A	D	A
179	A		A
180	A		A
181	A	A	A
182	A	A	A
183	A	A	A
184	A	A	A
185	A	A	A
186	A	A	A
187	A	A	A
188	A	A	A
189	A	A	A
190	A		A
191	A	A	A
192	A		
193	A	D	

Table 5 (Continued)

No	Test Example 1	Test Example 2	Test Example 3
194	A		
195	A	A	A
196	A	A	A
197	A	C	A
198	A	A	A
199	A	A	A
200	A	A	A
201	A	A	A
202	A		A
203	A	A	A
204	A	A	A
205	A	A	A
206	A	A	A
207	A	A	A
208	A	A	A
209	A		
210	A	A	A
211	A	A	A
212	A	A	A
213	A	A	A
214	A		
215	A		A
216	A	A	A

Table 5 (Continued)

No	Test Example 1	Test Example 2	Test Example 3
2 1 7	A	A	A
2 1 8	A	A	A
2 1 9	A	A	A
2 2 0	A	A	A
2 2 1	A	A	A
2 2 2	A		
2 2 3	A		
2 2 4	A		A
2 2 5	A	A	A
2 2 6	A	A	A
2 2 7	A	A	
2 2 8	A	A	
2 2 9	A	A	A
2 3 0	A	A	A
2 3 1	A	A	A
2 3 2	A	A	
2 3 3	A	A	
2 3 4	A	A	A
2 3 5	A	A	A
2 3 6	A	A	A
2 3 7	A	A	A
2 3 8	A	A	A
2 3 9	A	A	A

Table 5 (Continued)

No	Test Example 1	Test Example 2	Test Example 3
2 4 0	A	A	A
2 4 1	A	A	A
2 4 2	A	A	A
2 4 3	A	A	A
2 4 4	A	A	A
2 4 5	A	A	A
2 4 6	A	A	A
2 4 7	A	A	A
2 4 8	A	A	A
2 4 9	A	A	A
2 5 0	A	A	
2 5 1	A		A
2 5 2	A		A
2 5 3	A	A	A
2 5 4	A	A	A
2 5 5	A	A	A
2 5 6	A	A	A
2 5 7	A	A	A
2 5 8	A		
2 5 9	A	A	A
2 6 0	A	A	A
2 6 1	A	A	A
2 6 2	A	A	A

Table 5 (Continued)

	No	Test Example 1	Test Example 2	Test Example 3
5	2 6 3	A	A	A
10	2 6 4	A	A	A
	2 6 5	A	A	A
15	2 6 6	A	A	A
	2 6 7	A	A	A
	2 6 8	A	A	A
20	2 6 9	A	A	A
	2 7 0	A	A	A
	2 7 1	A	C	A
25	2 7 2	A	A	A
	2 7 3	A		C
30	2 7 4	A	C	A
	2 7 5	A		
	2 7 6	A	A	A
35	2 7 7	A		
	2 7 8	A	A	A
40	2 7 9	A		C
	2 8 0	A	C	A
	2 8 1	A	A	A
45	2 8 2	A	A	A
	2 8 3	A	A	A
50	2 8 4	A	A	A
	2 8 5	A	A	A

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Table 5 (Continu d)

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No	Test Example 1	Test Example 2	Test Example 3
2 8 6	A	C	A
2 8 7	A	A	A
2 8 8	A	A	A
2 8 9	A		
2 9 0	A	D	
2 9 2	A		
2 9 3	A		A
2 9 4	A	A	A
2 9 5	A	A	A
2 9 6	A	A	A
2 9 7	A	A	A
2 9 8	A		A
2 9 9	A	D	A
3 0 0	A		
3 0 1	A		A
3 0 2	A		A
3 0 3	A	A	A
3 0 5	A	A	A
3 0 6	A	A	A
3 0 7	A	A	
3 0 9	A	A	A
3 1 0	A	A	A
3 1 1	A	A	

Table 5 (Continued)

No	Test Example 1	Test Example 2	Test Example 3
3 1 2	A	A	A
3 1 3	A	A	A
3 1 4	A	A	A
3 1 5	A	A	A
3 1 6	A	A	A
3 1 7	A	A	A
3 1 8	A	A	A
3 1 9	A		A
3 2 0	A	C	D
3 2 1	A	A	A
3 2 2	A		
3 2 4	A		
3 2 5	A	A	A
3 2 6	A		A
3 2 7	A		A
3 2 8	A	A	A
3 2 9	A		A
3 3 0	A	A	A
3 3 2	A		A
3 3 3	A	A	A
3 3 4	A		A
3 3 5	A		D
3 3 6	A	C	A

Table 5 (Continued)

No	Test Example 1	Test Example 2	Test Example 3
3 3 7	A	A	
3 3 8	A	A	
3 3 9	A	A	A
3 4 0	A	A	
3 4 1	A	A	A
3 4 2	A		
3 4 3	A		
3 4 4	A		A
3 4 5	A		
3 4 6	A	A	A
3 4 7	A		
3 4 8	A	A	A
3 4 9	A	A	A
3 5 1	A	A	A
3 5 2	A		A
3 5 3	A		A
3 5 5	A	A	A
3 5 6	A		
3 5 7	A	A	A
3 5 8	A	A	A
3 5 9	A	A	A
3 6 0	A	A	A
3 6 1	A	A	A

Table 5 (Continued)

No	Test Example 1	Test Example 2	Test Example 3
3 6 2	A	A	A
3 6 3	A	A	A
3 6 4	A	A	A
3 6 5	A	A	A
3 6 6	A	A	A
3 6 7	A	A	A
3 6 8	A		A
3 6 9	A	A	A
3 7 0	A	A	
3 7 1	A	A	A
3 7 2	A	A	A
3 7 3	A	A	A
3 7 4	A	A	A
3 7 5	A	A	
3 7 6	A	C	A
3 7 7	A		
3 7 8	A		
3 7 9	A		
3 8 0	A	A	A
3 8 1	A	A	
3 8 2	A	A	A
3 8 3	A	A	A
3 8 4	A	D	A

Table 5 (Continued)

No	Test Example 1	Test Example 2	Test Example 3
3 8 5	A	C	
3 8 6	A		
3 8 7	A		
3 8 8	A	A	A
3 8 9	A		
3 9 0	A		
3 9 1	A		
3 9 2	A	D	A
3 9 3	A	A	A
3 9 4	A	A	A
3 9 5	A	A	A
3 9 6	A	A	A
3 9 7	A	A	A
3 9 8	A	A	A
3 9 9	A	A	A
4 0 0	A	A	A
4 0 1	A	A	A
4 0 2	A	A	A
4 0 3	A	A	A
4 0 4	A	A	A
4 0 5	A	A	A
4 0 6	A	A	A
4 0 7	A	A	A

Table 5 (Continued)

	No	Test Example 1	Test Example 2	Test Example 3
5				
	4 0 8	A	A	A
10	4 0 9	A	A	A
	4 1 0	A	A	
15	4 1 1	A	A	A
	4 1 2	A	A	A
	4 1 3	A	A	A
20	4 1 4	A	A	A
	4 1 5	A	A	A
	4 1 7	A	A	A
25	4 1 9	A	A	A
	4 2 0	A	A	A
30	4 2 1	A	A	A
	4 2 2	A	A	A
	4 2 3	A	A	A
35	4 2 4	A	A	B
	4 2 5	A	A	
40	4 2 6	A	D	C
	4 2 7	A	A	C
	4 2 8	A	D	A
45	4 2 9	A	A	A
	4 3 0	A	A	A
	4 3 1	A	A	A
50	4 3 2	A	A	A

55

Table 5 (Continued)

No	Test Example 1	Test Example 2	Test Example 3
4 3 3	A	A	A
4 3 4	A	A	A
4 3 5	A	A	A
4 3 6	A	A	A
4 3 7	A	A	A
4 3 8	A	A	A
4 3 9	A	A	A
4 4 0	A	A	A
4 4 1	A	A	A
4 4 2	A	A	A
4 4 3	A	A	A
4 4 4	A	D	A
4 4 5	A		A
4 4 6	A		
4 4 7	A		
4 4 8	A	A	A
4 4 9	A	A	A
4 5 0	A	A	A
4 5 1	A		A
4 5 2	A		
4 5 3	A	A	A
4 5 4	A	A	A
4 5 9	A		

Table 5 (Continued)

	No	Test Example 1	Test Example 2	Test Example 3
5	4 6 0	A	A	D
10	4 6 1	A		D
	4 6 2	A	D	A
15	4 6 3	A	A	A
	4 6 5	A		
	4 6 7	A	A	A
20	4 6 9	A		
	4 7 0	A	C	A
25	4 7 1	A		A
	4 7 2	A		A
	4 7 3	A		B
30	4 7 4	A		D
	4 7 5	A		A
	4 7 8	A		
35	4 8 0	A		A
	4 8 1	A	A	A
40	4 8 2	A	A	A
	4 8 3	A	A	A
	4 8 4	A	A	A
45	4 8 6	A	A	A
	4 9 0	A	C	A
50	4 9 1	—	—	—
	4 9 2	—	—	—

55

Table 5 (Continued)

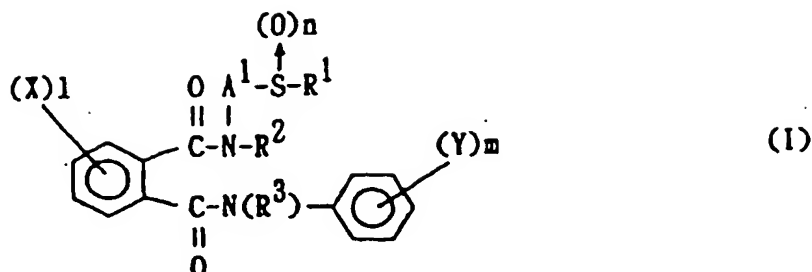
No	Test Example 1	Test Example 2	Test Example 3
4 9 3	—	—	—
4 9 4	—	—	—
4 9 5	—	—	—
4 9 6	—	—	—

Table 5 (Continued)

No	Test Example 1	Test Example 2	Test Example 3
2-3	A		A
2-5	A	C	
2-6	A	D	
2-7	A		
2-8	A	A	
2-9	A		
2-10	A	D	A
2-11	A		
2-12	A		A
2-13	A		A
2-14	A	C	A
2-15	A	A	A
2-16	A		
2-17	A	A	
3-1	A	A	
3-2	A		

Claims

1. A phthalamide derivative represented by the following general formula (I) or salt thereof:



wherein A¹ represents C₁-C₈ alkylene group, substituted C₁-C₈ alkylene group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, hydroxy C₁-C₆ alkyl group, C₁-C₆ alkoxy C₁-C₆ alkyl group, C₁-C₆ alkylthio C₁-C₆ alkyl group, C₁-C₆ alkoxycarbonyl group, phenyl group and substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, C₃-C₈ alkenylene group, substituted C₃-C₈ alkenylene group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, C₁-C₆ alkylthio C₁-C₆ alkyl group, C₁-C₆ alkoxycarbonyl group, phenyl group and substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, C₃-C₈ alkynylene group, or substituted C₃-C₈ alkynylene group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, C₁-C₆ alkylthio C₁-C₆ alkyl group, C₁-C₆ alkoxycarbonyl group, phenyl group and substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group,

further, an arbitrary saturated carbon atom in said C₁-C₈ alkylene group, substituted C₁-C₈ alkylene group, C₃-C₈ alkenylene group, substituted C₃-C₈ alkenylene group, C₃-C₈ alkynylene group and substituted C₃-C₈ alkynylene group may be substituted with a C₂-C₅ alkylene group to form a C₃-C₆ cycloalkane ring, and arbitrary two carbon atoms in said C₁-C₈ alkylene group, substituted C₁-C₈ alkylene group, C₃-C₈ alkenylene group and substituted C₃-C₈ alkenylene group may be taken conjointly with an alkylene group or an alkenylene group to form a C₃-C₆ cycloalkane ring or C₃-C₆ cycloalkene ring;

R¹ represents hydrogen atom, mercapto group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, phenylthio group, substituted phenylthio group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group,

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C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxy carbonyl group, heterocyclic group, substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxy carbonyl group, or -A²-R⁴ [wherein A² represents -C(=O)-, -C(=S)-, -C(=NR⁵)- (in which R⁵ represents hydrogen atom, C₁-C₆ alkyl group, C₁-C₆ alkoxy group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, C₁-C₆ alkoxy carbonyl group, phenyl group or substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxy carbonyl group),

C₁-C₈ alkylene group, halo C₁-C₈ alkylene group, C₃-C₆ alkenylene group, halo C₃-C₆ alkenylene group, C₃-C₆ alkynylene group or halo C₃-C₆ alkynylene group; and

(1) in cases where A² represents -C(=O)-, -C(=S)- or -C(=NR⁵)- wherein R⁵ is as defined above, R⁴ represents hydrogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxy carbonyl group, heterocyclic group, substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxy carbonyl group, or -Z¹-R⁶ wherein Z¹ represents -O-, -S- or -N(R⁷)- (wherein R⁷ represents hydrogen atom, C₁-C₆ alkyl group, C₁-C₆ alkylcarbonyl group, halo C₁-C₆ alkylcarbonyl group or C₁-C₆ alkoxy carbonyl group), and R⁶ represents hydrogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₃-C₆ alkenyl group, halo C₃-C₆ alkenyl group, C₃-C₆ alkynyl group, halo C₃-C₆ alkynyl group, C₃-C₆ cycloalkyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxy carbonyl group, phenyl C₁-C₄ alkyl group, substituted phenyl C₁-C₄ alkyl group having, on the ring thereof, at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxy carbonyl group, heterocyclic group, or substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxy carbonyl group, and

(2) in cases where A² represents C₁-C₈ alkylene group, halo C₁-C₈ alkylene group, C₃-C₆ alkenylene group, halo C₃-C₆ alkenylene group, C₃-C₆ alkynylene group or halo C₃-C₆ alkynylene group, R⁴ represents hydrogen atom, halogen atom, cyano group, nitro group, C₃-C₆ cycloalkyl group, halo

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C₃-C₆ cycloalkyl group, C₁-C₆ alkoxy carbonyl group, mono C₁-C₆ alkylaminocarbonyl group, di C₁-C₆ alkylaminocarbonyl group in which C₁-C₆ alkyl groups may be same or different, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxy carbonyl group, heterocyclic group, substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxy carbonyl group, or -Z²-R⁸ wherein Z² represents -O-, -S-, -SO-, -SO₂-, -N(R⁹)- (wherein R⁹ represents hydrogen atom, C₁-C₆ alkyl group, C₁-C₆ alkylcarbonyl group, halo C₁-C₆ alkylcarbonyl group, C₁-C₆ alkoxy carbonyl group, phenylcarbonyl group, or substituted phenylcarbonyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group), -C(=O)- or -C(=NOR¹⁰)- (wherein R¹⁰ represents hydrogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₃-C₆ alkenyl group, halo C₃-C₆ alkenyl group, C₃-C₆ alkynyl group, halo C₃-C₆ alkynyl group, C₃-C₆ cycloalkyl group, phenyl C₁-C₄ alkyl group or substituted phenyl C₁-C₄ alkyl group having, on the ring thereof, at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxy carbonyl group) and R⁸ represents hydrogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₃-C₆ alkenyl group, halo C₃-C₆ alkenyl group, C₃-C₆ alkynyl group, halo C₃-C₆ alkynyl group, C₃-C₆ cycloalkyl group, C₁-C₆ alkylcarbonyl group, halo C₁-C₆ alkylcarbonyl group, C₁-C₆ alkoxy carbonyl group, mono C₁-C₆ alkylaminocarbonyl group, di C₁-C₆ alkylaminocarbonyl group in which C₁-C₆ alkyl groups may be same or different, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxy carbonyl group, phenyl C₁-C₄ alkyl group, substituted phenyl C₁-C₄ alkyl group having, on the ring thereof, at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxy carbonyl group, heterocyclic group, or substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxy carbonyl group], or

alternatively, R¹ may be combined with A¹ to form a 5- to 8-membered ring which may be intercepted by 1 or 2, same or different oxygen atoms, sulfur atoms or nitrogen atoms;

R² and R³ which may be same or different, represent hydrogen atom, C₃-C₆ cycloalkyl group or -A²-R⁴ wherein A² and R⁴ are as defined above; or

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alternatively, R² may be combined with A¹ or R¹ to form a 5- to 7-membered ring which may be intercepted by 1 or 2, same or different oxygen atoms, sulfur atoms or nitrogen atoms;

X which may be same or different, represents halogen atom, cyano group, nitro group, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, C₁-C₆ alkoxy carbonyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxy carbonyl group, heterocyclic group, substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxy carbonyl group, or -A³-R¹¹ [wherein A³ represents -O-, -S-, -SO-, -SO₂-, -C(=O)-, -C(=NOR¹²)- (in which R¹² represents hydrogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₃-C₆ alkenyl group, halo C₃-C₆ alkenyl group, C₃-C₆ alkynyl group, C₃-C₆ cycloalkyl group, phenyl C₁-C₄ alkyl group or substituted phenyl C₁-C₄ alkyl group having, on the ring thereof, at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxy carbonyl group), C₁-C₆ alkylene group, halo C₁-C₆ alkylene group, C₂-C₆ alkenylene group, halo C₂-C₆ alkenylene group, C₂-C₆ alkynylene group or halo C₃-C₆ alkynylene group; and

(1) in cases where A³ represents -O-, -S-, -SO- or -SO₂-, R¹¹ represents halo C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkenyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxy carbonyl group, heterocyclic group, substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxy carbonyl group, or -A⁴-R¹³ (wherein A⁴ represents C₁-C₆ alkylene group, halo C₁-C₆ alkylene group, C₃-C₆ alkenylene group, halo C₃-C₆ alkenylene group, C₃-C₆ alkynylene group or halo C₃-C₆ alkynylene group, and R¹³ represents hydrogen atom, halogen atom, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, C₁-C₆ alkoxy carbonyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxy carbonyl group, or -A⁵-R¹⁴ (wherein A⁵ represents -O-, -S-, -SO-, -SO₂- or -C(=O)-, and R¹⁴ represents C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₃-C₆ alkenyl group, halo C₃-C₆ alkenyl group, C₃-C₆ alkynyl group, halo C₃-C₆ alkynyl group, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxy carbonyl group, heterocyclic group, or substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl

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alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group; and

provided that when X, R² and R³ simultaneously represent hydrogen atom, m represents an integer of 2, Y of the 2-position represents fluorine atom and Y of the 3-position represents chlorine atom, then A¹ is not propylene group, R¹ is not methyl group and n is not an integer of 0.

- wherein A¹ represents C₁-C₈ alkylene group, substituted C₁-C₈ alkylene group having at least one, same or different substituents selected from the group consisting of halogen atom, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, C₁-C₆ alkylthio C₁-C₆ alkyl group, phenyl group and substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, and C₁-C₆ alkylthio C₁-C₆ alkyl group, C₃-C₈ alkenylene group, or substituted C₃-C₈ alkenylene group having at least one, same or different substituents selected from the group consisting of halogen atom, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, and C₁-C₆ alkylthio C₁-C₆ alkyl group, C₃-C₈ alkynylene group, or substituted C₃-C₈ alkynylene group having at least one, same or different substituents selected from the group consisting of halogen atom, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group and C₁-C₆ alkylthio C₁-C₆ alkyl group,

further, an arbitrary saturated carbon atom in said C₁-C₈ alkylene group, substituted C₁-C₈ alkylene group, C₃-C₈ alkenylene group, substituted C₃-C₈ alkenylene group, C₃-C₈ alkynylene group and substituted C₃-C₈ alkynylene group may be substituted with a C₂-C₅ alkylene group to form a C₃-C₆ cycloalkane ring, and arbitrary two carbon atoms in said C₁-C₈ alkylene group, substituted C₁-C₈ alkylene group, C₃-C₈ alkenylene group and substituted C₃-C₈ alkenylene group may be taken conjointly with an alkylene group or an alkenylene group to form a C₃-C₆ cycloalkane ring or C₃-C₆ cycloalkene ring;

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C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group),

C₁-C₈ alkylene group, halo C₁-C₈ alkylene group, C₃-C₆ alkenylene group, halo C₃-C₆ alkenylene group, C₃-C₆ alkynylene group or halo C₃-C₆ alkynylene group; and

(1) in cases where A² represents -C(=O)-, -C(=S)- or -C(=NR⁵)- wherein R⁵ is as defined above, R⁴ represents hydrogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group, heterocyclic group, substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group, or -Z¹-R⁶ wherein Z¹ represents -O-, -S- or -N(R⁷)- (wherein R⁷ represents hydrogen atom, C₁-C₆ alkyl group, C₁-C₆ alkylcarbonyl group, halo C₁-C₆ alkylcarbonyl group or C₁-C₆ alkoxy carbonyl group), and R⁶ represents hydrogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₃-C₆ alkenyl group, halo C₃-C₆ alkenyl group, C₃-C₆ alkynyl group, halo C₃-C₆ alkynyl group, C₃-C₆ cycloalkyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group, phenyl C₁-C₄ alkyl group, substituted phenyl C₁-C₄ alkyl group having, on the ring thereof, at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group, heterocyclic group, or substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group, and

(2) in cases where A² represents C₁-C₈ alkylene group, halo C₁-C₈ alkylene group, C₃-C₆ alkenylene group, halo C₃-C₆ alkenylene group, C₃-C₆ alkynylene group or halo C₃-C₆ alkynylene group, R⁴ represents hydrogen atom, halogen atom, cyano group, nitro group, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, C₁-C₆ alkoxy carbonyl group, mono C₁-C₆ alkylaminocarbonyl group, di C₁-C₆ alkylaminocarbonyl group in which C₁-C₆ alkyl groups may be same or different, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group, heterocyclic group, substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, and halo C₁-C₆ alkylsulfonyl group, or -Z²-R⁸ wherein Z² represents -O-, -S-, -SO-, -SO₂-, -N(R⁹)- (wherein R⁹ represents hydrogen atom, C₁-C₆ alkyl group, C₁-C₆ alkylcarbonyl group, halo C₁-C₆ alkylcarbonyl group, C₁-C₆ alkoxy carbonyl group, phenylcarbonyl group, or substituted phenylcarbonyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group), -C(=O)- or -C(=NOR¹⁰)- (wherein R¹⁰ represents hydrogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₃-C₆ alkenyl group, halo C₃-C₆ alkenyl group, C₃-C₆ alkynyl group, halo C₃-C₆ alkynyl group, C₃-C₆ cycloalkyl group, phenyl C₁-C₄ alkyl group or substituted phenyl

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C₁-C₄ alkyl group having, on the ring thereof, at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, and halo C₁-C₆ alkylsulfonyl group) and R⁸ represents hydrogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₃-C₆ alkenyl group, halo C₃-C₆ alkenyl group, C₃-C₆ alkynyl group, halo C₃-C₆ alkynyl group, C₃-C₆ cycloalkyl group, C₁-C₆ alkylcarbonyl group, halo C₁-C₆ alkylcarbonyl group, C₁-C₆ alkoxy carbonyl group, mono C₁-C₆ alkylaminocarbonyl group, di C₁-C₆ alkylaminocarbonyl group in which C₁-C₆ alkyl groups may be same or different, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group, phenyl C₁-C₄ alkyl group, substituted phenyl C₁-C₄ alkyl group having, on the ring thereof, at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group, heterocyclic group, or substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group, or C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group], or

alternatively, R¹ may be combined with A¹ to form a 5- to 8-membered ring which may be intercepted by 1 or 2, same or different oxygen atoms, sulfur atoms or nitrogen atoms;

R² and R³ which may be same or different, represent hydrogen atom, C₃-C₆ cycloalkyl group or -A²-R⁴ wherein A² and R⁴ are as defined above; or

alternatively, R² may be combined with A¹ or R¹ to form a 5- to 7-membered ring which may be intercepted by 1 or 2, same or different oxygen atoms, sulfur atoms or nitrogen atoms;

X which may be same or different, represents halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₂-C₆ alkenyl group, halo C₂-C₆ alkenyl group, C₂-C₆ alkynyl group, halo C₂-C₆ alkynyl group, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, or C₁-C₆ alkoxy carbonyl group and 1 represents an integer of 0 to 4; and

alternatively, X may be taken conjointly with the adjacent carbon atom on the phenyl ring to form a fused ring, and said fused ring may have at least one, same or different substituents selected from the group consisting of halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group; and

Y may be same or different and represents halogen atom, cyano group, nitro group, halo C₃-C₆ cycloalkyl group, tri C₁-C₆ alkylsilyl group in which C₁-C₆ alkyl groups may be same or different, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group, heterocyclic group, substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group, or -A³-R¹¹ [wherein A³ represents -O-, -S-, -SO₂-, -SO₂-, -C(=O)-, -C(=NOR¹²)- (in which R¹² represents hydrogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₃-C₆ alkenyl group, halo C₃-C₆ alkenyl group, C₃-C₆ alkynyl group, C₃-C₆ cycloalkyl group, phenyl C₁-C₄ alkyl group or substituted phenyl C₁-C₄ alkyl group having, on the ring thereof, at least one, same or different substituents selected

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from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, and halo C₁-C₆ alkylsulfonyl group), C₁-C₆ alkylene group, halo C₁-C₆ alkylene group, C₂-C₆ alkenylene group, halo C₂-C₆ alkenylene group, C₂-C₆ alkynylene group or halo C₃-C₆ alkynylene group; and

(1) in cases where A³ represents -O-, -S-, -SO- or -SO₂-, R¹¹ represents phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, and halo C₁-C₆ alkylsulfonyl group, heterocyclic group, substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group, or -A⁴-R¹³ (wherein A⁴ represents C₁-C₆ alkylene group, halo C₁-C₆ alkylene group, C₃-C₆ alkenylene group, halo C₃-C₆ alkenylene group, C₃-C₆ alkynylene group or halo C₃-C₆ alkynylene group, and R¹³ represents hydrogen atom, halogen atom, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, and halo C₁-C₆ alkylsulfonyl group, or -A-R¹⁴ (wherein A⁵ represents -O-, -S-, -SO-, -SO₂- or -C(=O)-, and R¹⁴ represents C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₃-C₆ alkenyl group, halo C₃-C₆ alkenyl group, C₃-C₆ alkynyl group, halo C₃-C₆ alkynyl group, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group, heterocyclic group, or substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group)), and

(2) in cases where A³ represents -C(=O)- or -C(=NOR¹²)- wherein R¹² is as defined above, R¹¹ represents hydrogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₂-C₆ alkenyl group, halo C₂-C₆ alkenyl group, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group, phenylamino group, substituted phenylamino group having on the ring thereof, at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, C₁-C₆ alkylsulfonyl group, heterocyclic group, or substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group, and

(3) in cases where A³ represents C₁-C₆ alkylene group, halo C₁-C₆ alkylene group, C₂-C₆ alkenylene group, halo C₂-C₆ alkenylene group, C₂-C₆ alkynylene group or halo C₃-C₆ alkynylene group, R¹¹ represents hydrogen atom, hydroxy group, halogen atom, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, C₁-C₆ alkoxycarbonyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano

Year	Number of cases
1	1
5	5
10	6
15	6
20	6
25	6
30	1
35	6

40

45

n represents an integer of 0 to 2.

50

55

further, an arbitrary saturated carbon atom in said C₁-C₈ alkylene group and substituted C₁-C₈ alkylene group may be substituted with a C₂-C₅ alkylene group to form a C₃-C₆ cycloalkane ring, and arbitrary two carbon atoms in said C₁-C₈ alkylene group and substituted C₁-C₈ alkylene group may be taken conjointly with an alkylene group or an alkenylene group to form a C₇-C₉ cycloalkane ring;

R^1 represents hydrogen atom, mercapto group, C_1 - C_6 alkyl group, halo C_1 - C_6 alkyl group, C_3 - C_6 alkenyl group, halo C_3 - C_6 alkenyl group, C_3 - C_6 alkynyl group, halo C_3 - C_6 alkynyl group, C_3 - C_6 cycloalkyl group, halo C_3 - C_6 cycloalkyl group, C_1 - C_6 alkylthio group, halo C_1 - C_6 alkylthio group, C_1 - C_6 alkoxy C_1 - C_6 alkyl group, C_1 - C_6 alkylthio C_1 - C_6 alkyl group, mono C_1 - C_6 alkylamino C_1 - C_6 alkyl group, di C_1 - C_6 alkylamino C_1 - C_6 alkyl group in which C_1 - C_6 alkyl groups may be same or different, C_1 - C_6 alkylcarbonyl group, halo C_1 - C_6 alkylcarbonyl group, C_1 - C_6 alkylthiocarbonyl group, C_1 - C_6 alkoxycarbonyl group, mono C_1 - C_6 alkylaminocarbonyl group, di C_1 - C_6 alkylaminocarbonyl group in which C_1 - C_6 alkyl groups may be same or different, mono C_1 - C_6 alkylamino thiocarbonyl group, di C_1 - C_6 alkylamino thiocarbonyl group in which C_1 - C_6 alkyl groups may be same or different, C_1 - C_6 alkylcarbonyl C_1 - C_6 alkyl group, C_1 - C_6 alkoxyimino C_1 - C_6 alkyl group, C_1 - C_6 alkoxycarbonyl C_1 - C_6 alkyl group, mono C_1 - C_6 alkylaminocarbonyl C_1 - C_6 alkyl group, di C_1 - C_6 alkylaminocarbonyl C_1 - C_6 alkyl group in which C_1 - C_6 alkyl groups may be same or different, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C_1 - C_6 alkyl group, halo C_1 - C_6 alkyl group, C_1 - C_6 alkoxy group, halo C_1 - C_6 alkoxy group, C_1 - C_6 alkylthio group, halo C_1 - C_6 alkylthio group, C_1 - C_6 alkylsulfinyl group, halo C_1 - C_6 alkylsulfinyl group, C_1 - C_6 alkylsulfonyl group, halo C_1 - C_6 alkylsulfonyl group, mono C_1 - C_6 alkylamino group, di C_1 - C_6 alkylamino group in which C_1 - C_6 alkyl groups may be same or different and C_1 - C_6 alkoxycarbonyl group, phenyl C_1 - C_6 alkyl group, substituted phenyl C_1 - C_6 alkyl group having, on the ring thereof, at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C_1 - C_6 alkyl group, halo C_1 - C_6 alkyl group, C_1 - C_6 alkoxy group, halo C_1 - C_6 alkoxy group, C_1 - C_6 alkylthio group, halo C_1 - C_6 alkylthio group, C_1 - C_6 alkylsulfinyl group, halo C_1 - C_6 alkylsulfinyl group, C_1 - C_6 alkylsulfonyl group, halo C_1 - C_6 alkylsulfonyl group, mono C_1 - C_6 alkylamino group, di C_1 - C_6 alkylamino group in which C_1 - C_6 alkyl groups may be same or different and C_1 - C_6 alkoxycarbonyl group, phenylcarbonyl group, substituted phenylcarbonyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C_1 - C_6 alkyl group, halo C_1 - C_6 alkyl group, C_1 - C_6 alkoxy group, halo C_1 - C_6 alkoxy group, C_1 - C_6 alkylthio group, halo C_1 - C_6 alkylthio group, C_1 - C_6 alkylsulfinyl group, halo C_1 - C_6 alkylsulfinyl group, C_1 - C_6 alkylsulfonyl group, halo C_1 - C_6 alkylsulfonyl group, mono C_1 - C_6 alkylamino group, di C_1 - C_6 alkylamino group in which C_1 - C_6 alkyl groups may be same or different and C_1 - C_6 alkoxycarbonyl group, phenylthio group, substituted phenylthio group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C_1 - C_6 alkyl group, halo C_1 - C_6 alkyl group, C_1 - C_6 alkoxy group, halo C_1 - C_6 alkoxy group, C_1 - C_6 alkylthio group, halo C_1 - C_6 alkylthio group, C_1 - C_6 alkylsulfinyl group, halo C_1 - C_6 alkylsulfinyl group, C_1 - C_6 alkylsulfonyl group, halo C_1 - C_6 alkylsulfonyl group, mono C_1 - C_6 alkylamino group, di C_1 - C_6 alkylamino group in which C_1 - C_6 alkyl groups may be same or different and C_1 - C_6 alkoxycarbonyl group, heterocyclic group, or substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C_1 - C_6 alkyl group, halo C_1 - C_6 alkyl group, C_1 - C_6 alkoxy group, halo C_1 - C_6 alkoxy group, C_1 - C_6 alkylthio group, halo C_1 - C_6 alkylthio group, C_1 - C_6 alkylsulfinyl group, halo C_1 - C_6 alkylsulfinyl group, C_1 - C_6 alkylsulfonyl group, halo C_1 - C_6 alkylsulfonyl group, mono C_1 - C_6 alkylamino group, di C_1 - C_6 alkylamino group in which C_1 - C_6 alkyl groups may be same or different and C_1 - C_6 alkoxycarbonyl group, or

alternatively, R^1 may be combined with A^1 to form a 5- to 8-membered ring which may be intercepted by 1 or 2, same or different oxygen atoms, sulfur atoms or nitrogen atoms;

R^2 and R^3 which may be same or different, represent hydrogen atom, C_1 - C_6 alkyl group; or

alternatively, R^2 may be combined with A^1 or R^1 to form a 5- to 7-membered ring which may be intercepted by 1 or 2, same or different oxygen atoms, sulfur atoms or nitrogen atoms;

X which may be same or different, represents halogen atom, nitro group, C_1 - C_6 alkyl group, halo C_1 - C_6 alkyl group, C_2 - C_6 alkenyl group, halo C_2 - C_6 alkenyl group, C_2 - C_6 alkynyl group, halo C_2 - C_6 alkynyl group, C_3 - C_6 cycloalkyl group, halo C_3 - C_6 cycloalkyl group, C_1 - C_6 alkoxy group, halo C_1 - C_6 alkoxy group, C_1 - C_6 alkylthio group, halo C_1 - C_6 alkylthio group, C_1 - C_6 alkylsulfinyl group, halo C_1 - C_6 alkylsulfinyl group, C_1 - C_6 alkylsulfonyl group or halo C_1 - C_6 alkylsulfonyl group and 1 represents an integer of 0 to 4; and

alternatively, X may be taken conjointly with the adjacent carbon atom on the phenyl ring to form a fused ring, and said fused ring may have at least one, same or different substituents selected from the group consisting of halogen atom, C_1 - C_6 alkyl group, halo C_1 - C_6 alkyl group, C_1 - C_6 alkoxy group, halo C_1 - C_6 alkoxy group, C_1 - C_6 alkylthio group, halo C_1 - C_6 alkylthio group, C_1 - C_6 alkylsulfinyl group, halo C_1 - C_6 alkylsulfinyl group, C_1 - C_6 alkylsulfonyl group and halo C_1 - C_6 alkylsulfonyl group; and

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Y may be same or different and represents halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, hydroxy halo C₁-C₆ alkyl group, C₁-C₆ alkoxy halo C₁-C₆ alkyl group, C₁-C₆ alkylthio halo C₁-C₆ alkyl group, C₃-C₆ alkenyl group, halo C₃-C₆ alkenyl group, C₃-C₆ alkynyl group, halo C₃-C₆ alkynyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkoxy halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio halo C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy halo C₁-C₆ alkoxy group, halo C₃-C₆ alkenyloxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, halo C₁-C₆ alkoxy halo C₁-C₆ alkylthio group, halo C₁-C₆ alkenylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, C₁-C₆ alkoxycarbonyl group, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, and halo C₁-C₆ alkylsulfonyl group, phenoxy group, substituted phenoxy group having at least one, same or different substituents selected from the group consisting of halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, halo C₁-C₆ alkylsulfinyl group, and halo C₁-C₆ alkylsulfonyl group, phenylthio group, substituted phenylthio group having at least one, same or different substituents selected from the group consisting of halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, halo C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group having at least one, same or different substituents selected from the group consisting of halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, halo C₁-C₆ alkylsulfinyl group and halo C₁-C₆ alkylsulfonyl group, pyridylthio group, substituted pyridylthio group having at least one, same or different substituents selected from the group consisting of halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, halo C₁-C₆ alkylsulfinyl group and halo C₁-C₆ alkylsulfonyl group, pyridylthio group, substituted pyridylthio group having at least one, same or different substituents selected from the group consisting of halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, halo C₁-C₆ alkylsulfinyl group and halo C₁-C₆ alkylsulfonyl group; and m represents an integer of 1 to 5; and

Y may be taken conjointly with an adjacent carbon atom on the phenyl ring to form a fused ring, and said fused ring may have at least one, same or different substituents selected from the group consisting of halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group; and

n represents an integer of 0 to 2.

4. A phthalamide derivative or salt thereof according to Claim 3, wherein A¹ represents C₁-C₈ alkylene group;

R¹ represents hydrogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₃-C₆ alkenyl group, C₃-C₆ alkynyl group, C₃-C₆ cycloalkyl group, C₁-C₆ alkylthio group, C₁-C₆ alkoxy C₁-C₆ alkyl group, C₁-C₆ alkylthio C₁-C₆ alkyl group, C₁-C₆ alkylcarbonyl group, mono C₁-C₆ alkylaminocarbonyl group, di C₁-C₆ alkylaminocarbonyl group in which C₁-C₆ alkyl groups may be same or different, mono C₁-C₆ alkylaminothiocarbonyl group, di C₁-C₆ alkylaminothiocarbonyl group in which C₁-C₆ alkyl groups may be same or different, C₁-C₆ alkylcarbonyl C₁-C₆ alkyl group, C₁-C₆ alkoxymino C₁-C₆ alkyl group, C₁-C₆ alkoxycarbonyl C₁-C₆ alkyl group, mono C₁-C₆ alkylaminocarbonyl C₁-C₆ alkyl group or di C₁-C₆ alkylaminocarbonyl C₁-C₆ alkyl group in which C₁-C₆ alkyl groups may be same or different;

R² and R³ which may be same or different, represent hydrogen atom or C₁-C₆ alkyl group;

X which may be same or different, represents halogen atom, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group or halo C₁-C₆ alkylsulfonyl group; and 1 represents an integer of 0 to 4; and

alternatively, X may be taken conjointly with the adjacent carbon atom on the phenyl ring to form a fused ring, and said fused ring may have at least one, same or different substituents selected from the group consisting of halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group;

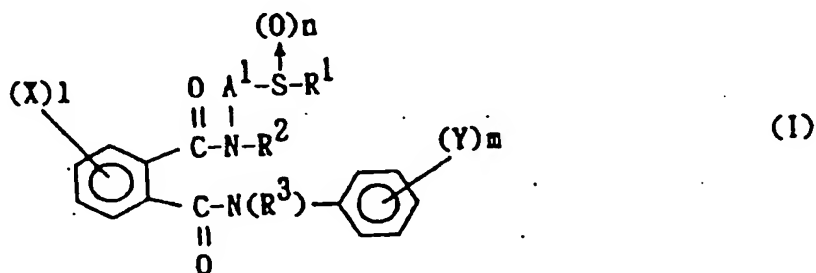
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Y may be same or different and represents halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, halo C₁-C₆ alkylsulfinyl group and halo C₁-C₆ alkylsulfonyl group, substituted phenoxy group having at least one, same or different substituents selected from the group consisting of halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, halo C₁-C₆ alkylsulfinyl group and halo C₁-C₆ alkylsulfonyl group, or substituted pyridyloxy group having at least one, same or different substituents selected from the group consisting of halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, halo C₁-C₆ alkylsulfinyl group and halo C₁-C₆ alkylsulfonyl group; and m represents an integer of 1 to 5; and

Y may be taken conjointly with an adjacent carbon atom on the phenyl ring to form a fused ring, and said fused ring may have at least one, same or different substituents selected from the group consisting of halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, halo C₁-C₆ alkylsulfinyl group and halo C₁-C₆ alkylsulfonyl group; and

n represents an integer of 0 to 2.

5. An agrohorticultural insecticide characterized by containing, as an active ingredient thereof, a phthalamide derivative represented by the following general formula (I) or salt thereof:



wherein A¹ represents C₁-C₈ alkylene group, substituted C₁-C₈ alkylene group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, hydroxy C₁-C₆ alkyl group, C₁-C₆ alkoxy C₁-C₆ alkyl group, C₁-C₆ alkylthio C₁-C₆ alkyl group, C₁-C₆ alkoxycarbonyl group, phenyl group and substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, C₃-C₈ alkenylene group, substituted C₃-C₈ alkenylene group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, C₁-C₆ alkylthio C₁-C₆ alkyl group, C₁-C₆ alkoxycarbonyl group, phenyl group and substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, C₃-C₈ alkynylene group, or substituted C₃-C₈ alkynylene group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group.

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group, halo C₁-C₆ alkylsulfonyl group, C₁-C₆ alkylthio C₁-C₆ alkyl group, C₁-C₆ alkoxycarbonyl group, phenyl group and substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group,

further, an arbitrary saturated carbon atom in said C₁-C₈ alkylene group, substituted C₁-C₈ alkylene group, C₃-C₈ alkenylene group, substituted C₃-C₈ alkenylene group, C₃-C₈ alkynylene group and substituted C₃-C₈ alkynylene group may be substituted with a C₂-C₅ alkylene group to form a C₃-C₆ cycloalkane ring, and arbitrary two carbon atoms in said C₁-C₈ alkylene group, substituted C₁-C₈ alkylene group, C₃-C₈ alkenylene group and substituted C₃-C₈ alkenylene group may be taken conjointly with an alkylene group or an alkenylene group to form a C₃-C₆ cycloalkane ring or C₃-C₆ cycloalkene ring;

R¹ represents hydrogen atom, mercapto group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, phenylthio group, substituted phenylthio group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, heterocyclic group, substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, or -A²-R⁴ [wherein A² represents -C(=O)-, -C(=S)-, -C(=NR⁵)- (in which R⁵ represents hydrogen atom, C₁-C₆ alkyl group, C₁-C₆ alkoxy group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, C₁-C₆ alkoxycarbonyl group, phenyl group or substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group),

C₁-C₈ alkylene group, halo C₁-C₈ alkylene group, C₃-C₆ alkenylene group, halo C₃-C₆ alkenylene group, C₃-C₆ alkynylene group or halo C₃-C₆ alkynylene group; and

(1) in cases where A² represents -C(=O)-, -C(=S)- or -C(=NR⁵)-; wherein R⁵ is as defined above, R⁴ represents hydrogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, heterocyclic group, substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, or -Z¹-R⁶ wherein Z¹ represents -O-, -S- or -N(R⁷)- (wherein R⁷ represents hydrogen atom, C₁-C₆ alkyl group, C₁-C₆ alkylcarbonyl group, halo C

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-C₆ alkylcarbonyl group or C₁-C₆ alkoxy carbonyl group), and R⁶ represents hydrogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₃-C₆ alkenyl group, halo C₃-C₆ alkenyl group, C₃-C₆ alkynyl group, halo C₃-C₆ alkynyl group, C₃-C₆ cycloalkyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxy carbonyl group, phenyl C₁-C₄ alkyl group, substituted phenyl C₁-C₄ alkyl group having, on the ring thereof, at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxy carbonyl group, heterocyclic group, or substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxy carbonyl group, and

(2) in cases where A² represents C₁-C₈ alkylene group, halo C₁-C₈ alkylene group, C₃-C₆ alkenylene group, halo C₃-C₆ alkenylene group, C₃-C₆ alkynylene group or halo C₃-C₆ alkynylene group, R⁴ represents hydrogen atom, halogen atom, cyano group, nitro group, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, C₁-C₆ alkoxy carbonyl group, mono C₁-C₆ alkylaminocarbonyl group, di C₁-C₆ alkylaminocarbonyl group in which C₁-C₆ alkyl groups may be same or different, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxy carbonyl group, heterocyclic group, substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxy carbonyl group, or -Z²-R⁸ wherein Z² represents -O-, -S-, -SO-, -SO₂-, -N(R⁹)- (wherein R⁹ represents hydrogen atom, C₁-C₆ alkyl group, C₁-C₆ alkylcarbonyl group, halo C₁-C₆ alkylcarbonyl group, C₁-C₆ alkoxy carbonyl group, phenylcarbonyl group, or substituted phenylcarbonyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group), -C(=O)- or -C(=NOR¹⁰)- (wherein R¹⁰ represents hydrogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₃-C₆ alkenyl group, halo C₃-C₆ alkenyl group, C₃-C₆ alkynyl group, halo C₃-C₆ alkynyl group, C₃-C₆ cycloalkyl group, phenyl C₁-C₄ alkyl group or substituted phenyl C₁-C₄ alkyl group having, on the ring thereof, at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxy carbonyl group) and R⁸ represents hydrogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₃-C₆ alkenyl group, halo C₃-C₆ alkenyl group, C₃-C₆ alkynyl group, halo C₃-C₆ alkynyl group, C₃-C₆ cycloalkyl group, C₁-C₆ alkylcarbonyl group, halo C₁-C₆ alkylcarbonyl group, C₁-C₆ alkoxy carbonyl group, mono C₁-C₆ alkylaminocarbonyl group, di C₁-C₆ alkylaminocarbonyl group in which C₁-C₆ alkyl groups may be same or different, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group,

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nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, phenyl C₁-C₄ alkyl group, substituted phenyl C₁-C₄ alkyl group having, on the ring thereof, at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, heterocyclic group, or substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group], or

alternatively, R¹ may be combined with A¹ to form a 5- to 8-membered ring which may be intercepted by 1 or 2, same or different oxygen atoms, sulfur atoms or nitrogen atoms;

R² and R³ which may be same or different, represent hydrogen atom, C₃-C₆ cycloalkyl group or -A²-R⁴ wherein A² and R⁴ are as defined above; or

alternatively, R² may be combined with A¹ or R¹ to form a 5- to 7-membered ring which may be intercepted by 1 or 2, same or different oxygen atoms, sulfur atoms or nitrogen atoms;

X which may be same or different, represents halogen atom, cyano group, nitro group, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, C₁-C₆ alkoxycarbonyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, heterocyclic group, substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, or -A³-R¹¹ [wherein A³ represents -O-, -S-, -SO-, -SO₂-, -C(=O)-, -C(=NOR¹²)- (in which R¹² represents hydrogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₃-C₆ alkenyl group, halo C₃-C₆ alkenyl group, C₃-C₆ alkynyl group, C₃-C₆ cycloalkyl group, phenyl C₁-C₄ alkyl group or substituted phenyl C₁-C₄ alkyl group having, on the ring thereof, at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group), C₁-C₆ alkylene group, halo C₁-C₆ alkylene group, C₂-C₆ alkenylene group, halo C₂-C₆ alkenylene group, C₂-C₆ alkynylene group or halo C₃-C₆ alkynylene group; and

(1) in cases where A³ represents -O-, -S-, -SO- or -SO₂-, R¹¹ represents halo C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkenyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, heterocyclic group, substituted heterocyclic group having at least one, same or different

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substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, or -A⁴-R¹³ (wherein A represents C₁-C₆ alkylene group, halo C₁-C₆ alkylene group, C₃-C₆ alkenylene group, halo C₃-C₆ alkenylene group, C₃-C₆ alkynylene group or halo C₃-C₆ alkynylene group, and R¹³ represents hydrogen atom, halogen atom, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, C₁-C₆ alkoxycarbonyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, or -A⁵-R¹⁴ (wherein A⁵ represents -O-, -S-, -SO-, -SO₂- or -C(=O)-, and R¹⁴ represents C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₃-C₆ alkenyl group, halo C₃-C₆ alkenyl group, C₃-C₆ alkynyl group, halo C₃-C₆ alkynyl group, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, heterocyclic group, or substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group)), and

(2) in cases where A³ represents -C(=O)- or -C(=NOR¹²)- wherein R¹² is as defined above, R¹¹ represents hydrogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₂-C₆ alkenyl group, halo C₂-C₆ alkenyl group, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, phenylamino group, substituted phenylamino group having on the ring thereof, at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, heterocyclic group, or substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, and

(3) in cases where A³ represents C₁-C₆ alkylene group, halo C₁-C₆ alkylene group, C₂-C₆ alkenylene group, halo C₂-C₆ alkenylene group, C₂-C₆ alkynylene group or halo C₃-C₆ alkynylene group, R¹¹ represents hydrogen atom, hydroxy group, halogen atom, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, C₁-C₆ alkoxycarbonyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group,

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C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, heterocyclic group, substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, or -A⁶-R¹⁵ (wherein A⁶ represents -O-, -S-, -SO- or -SO₂-, and R¹⁵ represents C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, heterocyclic group, substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, or -A⁷-R¹⁶ (wherein A⁷ represents C₁-C₆ alkylene group, halo C₁-C₆ alkylene group, C₂-C₆ alkenylene group, halo C₂-C₆ alkenylene group, C₂-C₆ alkynylene group or halo C₃-C₆ alkynylene group, and R¹⁶ represents hydrogen atom, halogen atom, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, phenoxy group, substituted phenoxy group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, phenylthio group, substituted phenylthio group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, heterocyclic group, substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group)); and I represents an integer of 0 to 4; and

alternatively, X may be taken conjointly with the adjacent carbon atom on the phenyl ring to form a fused ring, and said fused ring may have at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group; and

Y may be same or different and represents halogen atom, cyano group, nitro group, halo C₃-C₆ cycloalkyl

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group, tri C₁-C₆ alkylsilyl group in which C₁-C₆ alkyl groups may be same or different, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, heterocyclic group, substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, or -A³-R¹¹ wherein A³ and R¹¹ are as defined above; and m represents an integer of 0 to 5; and

Y may be taken conjointly with an adjacent carbon atom on the phenyl ring to form a fused ring, and said fused ring may have at least one, same or different substituents selected from the group consisting of halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, heterocyclic group, and substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group; and

n represents an integer of 0 to 2.

6. An agrohorticultural insecticide according to Claim 5,

wherein A¹ represents C₁-C₈ alkylene group, substituted C₁-C₈ alkylene group having at least one, same or different substituents selected from the group consisting of halogen atom, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, C₁-C₆ alkylthio C₁-C₆ alkyl group, phenyl group and substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group, C₃-C₈ alkenylene group, substituted C₃-C₈ alkenylene group having at least one, same or different substituents selected from the group consisting of halogen atom, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, and C₁-C₆ alkylthio C₁-C₆ alkyl group, C₃-C₈ alkynylene group, or substituted C₃-C₈ alkynylene group having at least one, same or different substituents selected from the group consisting of halogen atom, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group and C₁-C₆ alkylthio C₁-C₆ alkyl group,

further, an arbitrary saturated carbon atom in said C₁-C₈ alkylene group, substituted C₁-C₈ alkylene group, C₃-C₈ alkenylene group, substituted C₃-C₈ alkenylene group, C₃-C₈ alkynylene group and substituted C₃-C₈ alkynylene group may be substituted with a C₂-C₅ alkylene group to form a C₃-C₆ cycloalkane ring, and arbitrary two carbon atoms in said C₁-C₈ alkylene group, substituted C₁-C₈ alkylene group, C₃-C₈ alkenylene group and substituted C₃-C₈ alkenylene group may be taken conjointly with an alkylene group or an alkenylene group to form a C₃-C₆ cycloalkane ring or C₃-C₆ cycloalkene ring;

R¹ represents hydrogen atom, mercapto group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, phenyl group, substituted phenyl group having at least

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one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, phenylthio group, substituted phenylthio group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, heterocyclic group, substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, or -A²-R⁴ [wherein A² represents -C(=O)-, -C(=S)-, -C(=NR⁵)- (in which R⁵ represents hydrogen atom, C₁-C₆ alkyl group, C₁-C₆ alkoxy group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, C₁-C₆ alkoxycarbonyl group, phenyl group or substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, or halo C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group),

C₁-C₈ alkylene group, halo C₁-C₈ alkylene group, C₃-C₆ alkenylene group, halo C₃-C₆ alkenylene group, C₃-C₆ alkynylene group or halo C₃-C₆ alkynylene group; and

(1) in cases where A² represents -C(=O)-, -C(=S)- or -C(=NR⁵)- wherein R⁵ is as defined above, R⁴ represents hydrogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group, heterocyclic group, substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group, or -Z¹-R⁶ wherein Z¹ represents -O-, -S- or -N(R⁷)- (wherein R⁷ represents hydrogen atom, C₁-C₆ alkyl group, C₁-C₆ alkylcarbonyl group, halo C₁-C₆ alkylcarbonyl group or C₁-C₆ alkoxycarbonyl group), and R⁶ represents hydrogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₃-C₆ alkenyl group, halo C₃-C₆ alkenyl group, C₃-C₆ alkynyl group, halo C₃-C₆ alkynyl group, C₃-C₆ cycloalkyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group, phenyl C₁-C₄ alkyl group, substituted phenyl C₁-C₄ alkyl group having, on the ring thereof, at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group, heterocyclic group, or substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group, and

(2) in cases where A² represents C₁-C₈ alkylene group, halo C₁-C₈ alkylene group, C₃-C₆ alkenylene group, halo C₃-C₆ alkenylene group, C₃-C₆ alkynylene group or halo C₃-C₆ alkynylene group, R⁴ represents hydrogen atom, halogen atom, cyano group, nitro group, C₃-C₆ cycloalkyl group, halo

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C₃-C₆ cycloalkyl group, C₁-C₆ alkoxy carbonyl group, mono C₁-C₆ alkylaminocarbonyl group, di C₁-C₆ alkylaminocarbonyl group in which C₁-C₆ alkyl groups may be same or different, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group, heterocyclic group, substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, and halo C₁-C₆ alkylsulfonyl group, or -Z²-R⁸ wherein Z² represents -O-, -S-, -SO-, -SO₂-, -N(R⁹)- (wherein R⁹ represents hydrogen atom, C₁-C₆ alkyl group, C₁-C₆ alkylcarbonyl group, halo C₁-C₆ alkylcarbonyl group, C₁-C₆ alkoxy carbonyl group, phenylcarbonyl group, or substituted phenylcarbonyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group), -C(=O)- or -C(=NOR¹⁰)- (wherein R¹⁰ represents hydrogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₃-C₆ alkenyl group, halo C₃-C₆ alkenyl group, C₃-C₆ alkynyl group, halo C₃-C₆ alkynyl group, C₃-C₆ cycloalkyl group, phenyl C₁-C₄ alkyl group or substituted phenyl C₁-C₄ alkyl group having, on the ring thereof, at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, and halo C₁-C₆ alkylsulfonyl group) and R⁸ represents hydrogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₃-C₆ alkenyl group, halo C₃-C₆ alkenyl group, C₃-C₆ alkynyl group, halo C₃-C₆ alkynyl group, C₃-C₆ cycloalkyl group, C₁-C₆ alkylcarbonyl group, halo C₁-C₆ alkylcarbonyl group, C₁-C₆ alkoxy carbonyl group, mono C₁-C₆ alkylaminocarbonyl group, di C₁-C₆ alkylaminocarbonyl group in which C₁-C₆ alkyl groups may be same or different, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group, phenyl C₁-C₄ alkyl group, substituted phenyl C₁-C₄ alkyl group having, on the ring thereof, at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group, heterocyclic group, or substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group], or

alternatively, R¹ may be combined with A¹ to form a 5- to 8-membered ring which may be intercepted by 1 or 2, same or different oxygen atoms, sulfur atoms or nitrogen atoms;

R² and R³ which may be same or different, represent hydrogen atom, C₃-C₆ cycloalkyl group or -A²-R⁴ wherein A² and R⁴ are as defined above; or

alternatively, R² may be combined with A¹ or R¹ to form a 5- to 7-membered ring which may be intercepted by 1 or 2, same or different oxygen atoms, sulfur atoms or nitrogen atoms;

X which may be same or different, represents halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₂-C₆ alkenyl group, halo C₂-C₆ alkenyl group, C₂-C₆ alkynyl group, halo C₂-C₆ alkynyl group, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, or C₁-C₆ alkoxy carbonyl group and I represents an integer of 0 to 4; and

alternatively, X may be taken conjointly with the adjacent carbon atom on the phenyl ring to form a fused ring, and said fused ring may have at least one, same or different substituents selected from the group consisting of halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group; and

Y may be same or different and represents halogen atom, cyano group, nitro group, halo C₃-C₆ cycloalkyl group, tri C₁-C₆ alkylsilyl group in which C₁-C₆ alkyl groups may be same or different, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group, heterocyclic group, substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group, or -A³-R¹¹ [wherein A³ represents -O-, -S-, -SO-, -SO₂-, -C(=O)-, -C(=NOR¹²)- (in which R¹² represents hydrogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₃-C₆ alkenyl group, halo C₃-C₆ alkenyl group, C₃-C₆ alkynyl group, C₃-C₆ cycloalkyl group, phenyl C₁-C₄ alkyl group or substituted phenyl C₁-C₄ alkyl group having, on the ring thereof, at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, and halo C₁-C₆ alkylsulfonyl group), C₁-C₆ alkylene group, halo C₁-C₆ alkylene group, C₂-C₆ alkenylene group, halo C₂-C₆ alkenylene group, C₂-C₆ alkynylene group or halo C₃-C₆ alkynylene group; and

(1) in cases where A³ represents -O-, -S-, -SO- or -SO₂-, R¹¹ represents phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, and halo C₁-C₆ alkylsulfonyl group, heterocyclic group, substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group, or -A⁴-R¹³ (wherein A⁴ represents C₁-C₆ alkylene group, halo C₁-C₆ alkylene group, C₃-C₆ alkenylene group, halo C₃-C₆ alkenylene group, C₃-C₆ alkynylene group or halo C₃-C₆ alkynylene group, and R¹³ represents hydrogen atom, halogen atom, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, and halo C₁-C₆ alkylsulfonyl group, or -A⁵-R¹⁴ (wherein A⁵ represents -O-, -S-, -SO-, -SO₂- or -C(=O)-, and R¹⁴ represents C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₃-C₆ alkenyl group, halo C₃-C₆ alkenyl group, C₃-C₆ alkynyl group, halo C₃-C₆ alkynyl group, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group, heterocyclic group, or substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group)), and

(2) in cases where A³ represents -C(=O)- or -C(=NOR¹²)- wherein R¹² is as defined above, R¹¹ represents hydrogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₂-C₆ alkenyl group, halo C₂-C₆ alkenyl group, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, mono

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C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group, phenylamino group, substituted phenylamino group having on the ring thereof, at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group, heterocyclic group, or substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group, and

[illegible]

group))]] and m represents an integer of 1 to 5; and

Y may be taken conjointly with an adjacent carbon atom on the phenyl ring to form a fused ring, and said fused ring may have at least one, same or different substituents selected from the group consisting of halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group; and

n represents an integer of 0 to 2.

7. An agrohorticultural insecticide according to Claim 6,

wherein A¹ represents C₁-C₈ alkylene group, substituted C₁-C₈ alkylene group having at least one, same or different substituents selected from the group consisting of halogen atom, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group and C₁-C₆ alkylthio C₁-C₆ alkyl group and

further, an arbitrary saturated carbon atom in said C₁-C₈ alkylene group and substituted C₁-C₈ alkylene group may be substituted with a C₂-C₅ alkylene group to form a C₃-C₆ cycloalkane ring, and arbitrary two carbon atoms in said C₁-C₈ alkylene group and substituted C₁-C₈ alkylene group may be taken conjointly with an alkylene group or an alkenylene group to form a C₃-C₆ cycloalkane ring;

R¹ represents hydrogen atom, mercapto group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₃-C₆ alkenyl group, halo C₃-C₆ alkenyl group, C₃-C₆ alkynyl group, halo C₃-C₆ alkynyl group, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkoxy C₁-C₆ alkyl group, C₁-C₆ alkylthio C₁-C₆ alkyl group, mono C₁-C₆ alkylamino C₁-C₆ alkyl group, di C₁-C₆ alkylamino C₁-C₆ alkyl group in which C₁-C₆ alkyl groups may be same or different, C₁-C₆ alkylcarbonyl group, halo C₁-C₆ alkylcarbonyl group, C₁-C₆ alkylthiocarbonyl group, C₁-C₆ alkoxycarbonyl group, mono C₁-C₆ alkylaminocarbonyl group, di C₁-C₆ alkylaminocarbonyl group in which C₁-C₆ alkyl groups may be same or different, mono C₁-C₆ alkylamino thiocarbonyl group, di C₁-C₆ alkylamino thiocarbonyl group in which C₁-C₆ alkyl groups may be same or different, C₁-C₆ alkylcarbonyl C₁-C₆ alkyl group, C₁-C₆ alkoxylimino C₁-C₆ alkyl group, C₁-C₆ alkoxycarbonyl C₁-C₆ alkyl group, mono C₁-C₆ alkylaminocarbonyl C₁-C₆ alkyl group, di C₁-C₆ alkylaminocarbonyl C₁-C₆ alkyl group in which C₁-C₆ alkyl groups may be same or different, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different and C₁-C₆ alkoxycarbonyl group, phenyl C₁-C₆ alkyl group, substituted phenyl C₁-C₆ alkyl group having, on the ring thereof, at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, and C₁-C₆ alkoxycarbonyl group, phenylcarbonyl group, substituted phenylcarbonyl group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different and C₁-C₆ alkoxycarbonyl group, substituted phenylthio group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different and C₁-C₆ alkoxycarbonyl group, heterocyclic group, or substituted heterocyclic group having at least one, same or different substituents selected from the group consisting of halogen atom, cyano group, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, halo

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C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different and C₁-C₆ alkoxycarbonyl group, or

alternatively, R¹ may be combined with A¹ to form a 5- to 8-membered ring which may be intercepted by 1 or 2, same or different oxygen atoms, sulfur atoms or nitrogen atoms;

R² and R³ which may be same or different, represent hydrogen atom, C₁-C₆ alkyl group; or

alternatively, R² may be combined with A¹ or R¹ to form a 5- to 7-membered ring which may be intercepted by 1 or 2, same or different oxygen atoms, sulfur atoms or nitrogen atoms;

X which may be same or different, represents halogen atom, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₂-C₆ alkenyl group, halo C₂-C₆ alkenyl group, C₂-C₆ alkynyl group, halo C₂-C₆ alkynyl group, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group or halo C₁-C₆ alkylsulfonyl group and 1 represents an integer of 0 to 4; and

alternatively, X may be taken conjointly with the adjacent carbon atom on the phenyl ring to form a fused ring, and said fused ring may have at least one, same or different substituents selected from the group consisting of halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group; and

Y may be same or different and represents halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, hydroxy halo C₁-C₆ alkyl group, C₁-C₆ alkoxy halo C₁-C₆ alkyl group, C₁-C₆ alkylthio halo C₁-C₆ alkyl group, C₃-C₆ alkenyl group, halo C₃-C₆ alkenyl group, C₃-C₆ alkynyl group, halo C₃-C₆ alkynyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkoxy halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio halo C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy halo C₁-C₆ alkoxy group, halo C₃-C₆ alkenyloxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, halo C₁-C₆ alkoxy halo C₁-C₆ alkylthio group, halo C₁-C₆ alkenylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, mono C₁-C₆ alkylamino group, di C₁-C₆ alkylamino group in which C₁-C₆ alkyl groups may be same or different, C₁-C₆ alkoxycarbonyl group, C₃-C₆ cycloalkyl group, halo C₃-C₆ cycloalkyl group, phenyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, halo C₁-C₆ alkylsulfinyl group, and halo C₁-C₆ alkylsulfonyl group, phenoxy group, substituted phenoxy group having at least one, same or different substituents selected from the group consisting of halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, halo C₁-C₆ alkylsulfinyl group, and halo C₁-C₆ alkylsulfonyl group, phenylthio group, substituted phenylthio group having at least one, same or different substituents selected from the group consisting of halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, halo C₁-C₆ alkylsulfinyl group and halo C₁-C₆ alkylsulfonyl group, pyridyloxy group, substituted pyridyloxy group having at least one, same or different substituents selected from the group consisting of halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, halo C₁-C₆ alkylsulfinyl group and halo C₁-C₆ alkylsulfonyl group, pyridylthio group, substituted pyridylthio group having at least one, same or different substituents selected from the group consisting of halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, halo C₁-C₆ alkylsulfinyl group and halo C₁-C₆ alkylsulfonyl group; and m represents an integer of 1 to 5; and

Y may be taken conjointly with an adjacent carbon atom on the phenyl ring to form a fused ring, and said fused ring may have at least one, same or different substituents selected from the group consisting of halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group; and

n represents an integer of 0 to 2.

8. An agrohorticultural insecticide according to Claim 7, wherein A¹ represents C₁-C₆ alkylene group;

R¹ represents hydrogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₃-C₆ alkenyl group, C₃-C₆ alkynyl group, C₃-C₆ cycloalkyl group, C₁-C₆ alkylthio group, C₁-C₆ alkoxy C₁-C₆ alkyl group, C₁-C₆ alkylthio C₁-C₆ alkyl group, C₁-C₆ alkylcarbonyl group, mono C₁-C₆ alkylaminocarbonyl group, di C₁-C₆ alkylaminocarbonyl group in which C₁-C₆ alkyl groups may be same or different, mono C₁-C₆ alkylaminothiocarbonyl group, di C₁-C₆ alkylaminothiocarbonyl group in which C₁-C₆ alkyl groups may be same or different, C₁-C₆ alkylcarbonyl C₁-C₆ alkyl group, C₁-C₆ alkoxyimino C₁-C₆ alkyl group, C₁-C₆ alkoxyimino C₁-C₆ alkyl group, mono C₁-C₆ alkylaminocarbonyl C₁-C₆ alkyl group or di C₁-C₆ alkylaminocarbonyl C₁-C₆ alkyl group in which C₁-C₆ alkyl groups may be same or different;

R² and R³ which may be same or different, represent hydrogen atom or C₁-C₆ alkyl group;

X which may be same or different, represents halogen atom, nitro group, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group or halo C₁-C₆ alkylsulfonyl group; and 1 represents an integer of 0 to 4; and

alternatively, X may be taken conjointly with the adjacent carbon atom on the phenyl ring to form a fused ring, and said fused ring may have at least one, same or different substituents selected from the group consisting of halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group and halo C₁-C₆ alkylsulfonyl group;

Y may be same or different and represents halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy halo C₁-C₆ alkyl group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, C₁-C₆ alkylsulfinyl group, halo C₁-C₆ alkylsulfinyl group, C₁-C₆ alkylsulfonyl group, halo C₁-C₆ alkylsulfonyl group, substituted phenyl group having at least one, same or different substituents selected from the group consisting of halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, halo C₁-C₆ alkylsulfinyl group and halo C₁-C₆ alkylsulfonyl group, substituted phenoxy group having at least one, same or different substituents selected from the group consisting of halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, halo C₁-C₆ alkylsulfinyl group and halo C₁-C₆ alkylsulfonyl group, or substituted pyridyloxy group having at least one, same or different substituents selected from the group consisting of halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, halo C₁-C₆ alkylsulfinyl group and halo C₁-C₆ alkylsulfonyl group; and m represents an integer of 1 to 5; and

Y may be taken conjointly with an adjacent carbon atom on the phenyl ring to form a fused ring, and said fused ring may have at least one, same or different substituents selected from the group consisting of halogen atom, C₁-C₆ alkyl group, halo C₁-C₆ alkyl group, C₁-C₆ alkoxy group, halo C₁-C₆ alkoxy group, C₁-C₆ alkylthio group, halo C₁-C₆ alkylthio group, halo C₁-C₆ alkylsulfinyl group and halo C₁-C₆ alkylsulfonyl group; and

n represents an integer of 0 to 2.

9. A method for using an agrohorticultural insecticide, characterized by treating an objective crop or applying to soil in an effective quantity of the agrohorticultural insecticide according to any one of Claims 5 to 8 for the purpose of protecting a useful crop.